AN EMPIRICAL ANALYSIS OF DETERMINANTS OF FINANCIAL PERFORMANCE OF INSURANCE COMPANIES IN THE UNITED KINGDOM

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ABSTRACT

The determinants that affect the financial performance of an insurance company are complicated due to the intangible nature of insurance products and the lack of transparency in the market. Consequently, the financial performance of insurance companies is important to various stakeholders such as policyholders, insurance intermediaries and policymakers. This study aims to investigate the determinants of financial performance of insurance companies based on their financial strength rating performance. The empirical data are drawn from A.M. Best Insurance Report Online: Non-US Database. The sample consists of 57 insurers in the United Kingdom over the period of 2006 to 2010. The analyses include eight firm-specific variables, which are leverage, profitability, liquidity, size, reinsurance, growth, type of business and organisational form. Rating transition matrices and regression models are employed in this study. Rating transition analysis demonstrates a significant degree of rating changes, as reflected in the rating fluctuations. Based on the empirical results, this study establishes that profitability, liquidity, size and organisational form are statistically significant determinants of financial performance of insurance companies in the United Kingdom. This study recommends an alternative to measure the size of an insurance company, which is based on the gross premium written. In addition, this study provides insights into the effects of the global financial crisis on the financial performance of the insurance companies.

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DEDICATIONS

This dissertation is dedicated to my late loving mother;
Zaridah Talib (September 1955 – March 2015),

My beloved father, sisters and brothers,

And to the men in my life,
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LIST OF ABBREVIATIONS

3rd Dir.	3rd Life / Non-Life Directives
ABI	Association of British Insurer
Ave. RA	Average Rating Activity
Ave. RD	Average Rating Drift
Best	A.M Best Rating Agency
CAMEL	Capital Adequacy, Management Operations, Earnings and Liquidity
DEA	Data Envelopment Analysis
EU	European Union
FCA	Financial Conduct Authority
FP	Financial Performance
FPC	Financial Policy Committee
FSA	Financial Services Authority
FSR	Financial Strength Rating
ID	Insurance Density
IP	Insurance Penetration
IT	Information Technology
NAIC	National Association of Insurance Companies
NPW	Net Premium Written
Obs.	Observation
OPM	Ordered Probit Regression Model
Post-FC	Post-Financial Crisis
PRA	Prudential Regulation Authority
Pre-FC	Pre-Financial Crisis
RA	Rating Activity
RD	Rating Drift
RM	Rating Magnitude
RTM	Rating Transition Matrices
S&P	Standard & Poor Rating Agency
UK	United Kingdom
US	United States

CHAPTER 1
INTRODUCTION TO THE RESEARCH

Risk and uncertainty exist in all aspects of our lives. We are susceptible to the possibility of loss events that could lead to severe social, human or financial consequences such as natural disasters, sickness, accidents, disability, death and property damage. The desire to protect oneself from losses and damages is a fundamental concept of human behaviour. This desire then leads to the creation of insurance and the insurance industry (Baltensperger and Bodmer 2012). The basis of insurance requires individuals or entities (policyholders) to pay a fixed amount of money at regular intervals (premium) into a pooled fund (insurance scheme). This money will be used to compensate one or more policyholders who have suffered loss in a predefined event or particular circumstances (scope of coverage). The insurance mechanism is an intrinsic part of the society and social behaviour. It includes the organisation and mitigation of risks that conform to the principle of shared responsibility between the insurer and insured (policyholder).

Insurance plays a significant role in the economy because of its double functions – risk transfer and indemnification and financial intermediation (Lee et al. 2013). As a risk transfer and indemnification mechanism, insurance protects households and enterprises from risks detrimental to economic activities. Life insurance indemnifies individuals against the loss of life and sickness in unexpected events, thus stabilising the financial security of the family. General insurance (or non-life insurance) compensates for the damage of property for individuals and enterprises which are beneficial for business and facilitate investments. Insurance helps to improve the capability of individuals and businesses to tolerate risks, and this leads to the evolvement of economic activities. In addition, insurance is effective in reducing uncertainty and volatility of the economic system. It also contributes to the stabilization of the economic cycle and mitigation of the shock and crises at micro and macro levels (Haiss and Sűmegi 2008).

On the other hand, insurance companies serve as a financial intermediary through their investments. The insurance premiums which are accumulated in advance will be invested in the capital market. Insurance companies are one of the important institutional investors in the capital market. This function improves the allocation efficiency of capital and in turn benefits economic growth (Webb et al. 2002). In addition, the interaction between insurance firms and other financial intermediaries could further benefit economic activity. For instance, insurance companies could support bank intermediation activity and encourage higher levels of lending by means of collaterising credit, which reduces the bank's credit risk exposures (Zou and Adams 2008).

As a provider of financial and social security, insurance also contributes to a more stabilised and gradual increase in consumption, which becomes the driver of economic growth. The association between insurance development and economic growth has been studied and proven to be positively correlated (Enz 2000, Harichandra and Thangavelu 2004, Arena 2006 and Grant 2012). A more developed and efficient insurance market will lead to a greater contribution towards economic prosperity (Skipper 2001 and Liedtke 2007). The importance of insurance development on economic growth has been documented in a vast body of literature (Ward and Zurbruegg 2000, Skipper 2001, Arena 2008, Haiss and Sűmegi 2008, Han et al 2010, Grant 2012 and Lee et al 2013).

Despite all of its significant contributions to the economy, the insurance industry has been misunderstood by many. Wűrmli (2011) points out that the insurance community has failed to persuade the public of its importance to the society and the regulators have failed to perform regulations properly. In this instance, the insurer's knowledge and expertise are not adequately recognised by the society. Unlike the banking institutions, the insurance industry is less transparent and less informative in terms of educating the public about their mechanism, precise method of operations and contributions to the society.

The insurance industry is subject to very strict regulations (Malik 2011, Mao et al 2014 and Crawford et al 2014). Supervision starts from the initial establishment of the type of risk that can be underwritten by the insurer. It also covers the direct protection of consumers to specific contractual agreements such as reinsurance schemes and other risk transfer alternatives, the language used in contracts and general and special requirements for the capital held. Traditionally, insurance supervision focused on product regulations, terms and prices of individual policy. However, as a consequence of the recent financial crisis, the focus has shifted towards a comprehensive regulation of solvency. The solvency regulation of financial institutions is set to tighten further. Under the solvency regulation, the primary concern is to protect policyholders from losses when an insurer defaults, potentially leaving the policyholder in a precarious economic situation (Baltensperger and Bodmer 2012).

1.1 BACKGROUND TO THE RESEARCH

The insurance industry is one of the key players in the financial service sector in almost all developed and developing nations. It contributes to economic growth, efficient resource allocation, reduction of transaction costs, creation of liquidity, facilitation of the economies of scale in investment, and the spread of financial losses (Skipper 2001, Das et al. 2003, CEA 2006, Haiss & Sümegi, 2008, Malik 2011, Doumpos et al. 2012 and Sambasivam and Ayele 2013). As the financial intermediaries and suppliers of risk management services, insurance companies (both life and general) perform important macroeconomic functions such as risk diversification, risk transfer and loss mitigation (Ward and Zurbruegg 2000, Skipper 2001, Kugler and Ofoghi 2005 and ABI 2008). Subsequently, life insurers also contribute towards investment by providing the means to create personal savings through life and pension contracts (Carter and Falush 2009).

The insurance industry worldwide is undergoing changes driven by economic growth, liberalised markets, international harmonisation and changes within firms in response to adverse developments (Thorburn 2004).

Its ability to compete and adapt to changes is imperative to ensure its sustainability and stability in the volatile financial markets. The industry faces challenges in ensuring efficient operation in a liberalised business atmosphere. Some of the notable challenges include global competitions from other established entities, issues of professionalism, demographic changes, insurance capacity, aggregators and consolidators and widening insurability (Chen and Wong 2004, Carter and Falush 2009 and Ismail 2013).

Due to its important micro and macroeconomics functions, the performance of the insurance industry worldwide has become one of the primary concerns in many investigations. Consequently, the financial performance of insurance firms is important to various stakeholders, namely the policyholders, agents and policy makers (Doumpos et al 2012 and Ismail 2013). Thus, it raises issues of how one can measure the financial performance of insurance companies and what are the specific determinants that influence the financial performance of these firms.

The determinants that affect the financial performance of an insurance company are complicated due to the intangible nature of the product and the lack of transparency in resource allocation decisions (Berger and Humprey 1997 and Burca and Batrinca 2014). Under the corporate governance theory, financial performance of a company is determined by its leverage (Berger and di Patti 2002). Adams and Buckle (2003) define financial performance as a function of the effectiveness of organizational-specific contractual mechanisms to attract, control and retain managerial skills in order to maximise shareholders' wealth. Nonetheless, Greene and Segal (2004) assert that the financial performance of an insurer is defined in terms of its net premium earned, return on investment, return on equity, underwriting profit and the annual turnover. These variables are categorised as the profit performance measures and investment performance measures. Other studies identify profitability as the key performance indicator, and it is best measured using return on asset (ROA) (Hardwick and Adams 1999,

Malik 2011 and Sambasivam and Ayele 2013). However, these variables are not the ultimate measures of financial performance.

Financial performance is a frequently-used term in the literature, but to date there is no consensus about its universal definition. The concept of "financial performance" has been interchangeably used with other terms such as "financial strength", "financial solvency", "financial health" and "financial stability". The various terms used are essential measures of financial performance and do not imply failure or possible failure of a company (Chen and Wong 2004).

Kahane et al (1989) state that the financial strength of insurance companies can be defined from several perspectives – actuarial, financial, legal, accounting, etc., and he emphasises on the lack of a clear definition. Without a standard or universally accepted definition (Allen and Wood 2006, Goodhart 2006, Poloz 2006 and Gadanecz and Jayaram 2008), financial strength refers to the smooth functioning of the key elements that makes up the financial systems (Duisenberg 2001 and Oosterloo and de Haan 2004). Stella (2008) relates financial strength with unrestricted financial power. Alternatively, the European Central Bank (ECB 2007) defines financial stability as a financial system that is capable of withstanding shocks and financial imbalances, thus reducing the likelihood of disruptions in the financial intermediation process. Thus, the key aspects of defining financial performance are the stability of the system and the ability to withstand shocks in the operations.

Cases of insurance companies' failures in recent years and the increasingly challenging financial environment have raised further concerns about the financial performance of the insurance industry to its stakeholders. In addition, the recent global financial crisis has affected the financial stability of the financial service providers such as banks and insurance companies in the UK (Boyle 2013).

The aim of this study is to identify the determinants of financial performance (FP) of insurance companies operating in the United Kingdom (UK) by evaluating their rating performance. This study attempts to investigate rating trends and attempts to forecast rating movements through the application of rating transition matrices. It will also identify the determinants of the financial strength rating performance and the extent to which each factor influences performance. This study extends previous research by providing a comparative analysis of the determinants of the financial performance between two different periods – namely the pre-financial crisis period and post- financial crisis periods.

1.2 MOTIVATION FOR THE RESEARCH

The performance of insurance companies does not only contribute to improve the market value of individual firms but also towards industrial growth. It will ultimately lead towards the overall growth and prosperity of the economy. In addition, the financial performance of insurance companies is of utmost importance to various stakeholders such as policy makers, insurance intermediaries and policyholders. This subject has attracted much attention, comments and interests from various parties such as the regulators, financial experts, researchers, management of business entities and the general public (Omondi and Muturi 2013). Mehari and Aemiro (2013) summarise that evaluating the determinants of insurers' performance has become an important research theme in the corporate finance literature. Instead of providing risk transfer mechanism, insurers also play a major role in channelling funds to support business activities in the economy.

Pottier and Sommer (1999) argue that academic literature on the determinants of insurer's financial performance is limited. The same argument is raised in many other scholars' researches (Pottier 1998, Burton et al 2003, Florez-Lopez 2007 and Burca and Batrinca 2014). There is indeed an ultimate difference between assessing insurance companies as compared to other corporations (Buckley 1997, Florez-Lopez 2007 and Yakob et al 2013). The importance and complexity of the insurance industry

could affect the financial strength assessment process and thus, they must be acknowledged.

In addition, there are various definitions, interpretations and measurements of financial performance. However, there is no ultimate consensus on the best way to measure performance and to identify the factors that affect financial performance (Liargovas and Skandalis 2008 and Omondi and Muturi 2013). In this study, financial performance is proxied by the rating performance of insurance companies in the UK. The motivations for this research are presented as follows:

i. The financial performance of insurance companies could be reflected by the changes in the rating grades. A firm is susceptible to a rating upgrade or a rating downgrade, which is a signal to depict the current financial condition (Hadad et al 2009). In this instance, we employ the Rating Transition Matrices (RTM) to depict rating transitions (migration or movement to another rating grade). RTM or Credit Migration Matrices have been used extensively to study rating performance on large financial corporations and banks (Bangia et al 2002, Frydman and Schuermann 2008 and Stefanescu et al 2009), corporate bond performance (Kavvathas 2001 and Hadad et al 2009), sovereign credit ratings (Hu et al 2001 and Hill et al 2010) and consumer loans (Malik and Thomas 2012). Subsequently, Wang (2010) evaluates rating transitions for US insurance companies and establishes that insurer rating changes differ across economic and industry cycles. So far, there has been little discussion pertaining to the insurer's rating transition in the UK. Thus, this study attempts to fill the gap by evaluating the rating transitions among UK insurers. The analysis will be based on the widely-used Markov theory, but its application will be focused on the UK insurance industry.

ii. Insurer ratings are extensively used to evaluate insurers' financial strength and insolvency risk (Wang and Carson 2014). However, previous studies focused mainly on insurers in the United States (US)

(Gaver and Pottier 2005, Wang 2010, Eckles and Pottier 2011, Doherty et al 2012, Eckles and Halek 2012, Kartasheva and Park 2012 and Wang and Carson 2014). Earlier studies also focus on debt rating determinants of financial corporation and banks (Blume et al 1998, Tabakis and Vinci 2002, Altman and Rijken 2004 and Amato and Furfine 2004).

To the best of author's knowledge, the most prominent study that evaluates UK insurers' rating performance is the one conducted by Adams et al (2003). Their study compares insurer rating performance between two rating agencies and the tendency to be rated by a particular rating agency. This study attempts to extend the works of Adams et al (2003) and Gaver and Pottier (2005) by focusing on UK insurance companies. It seeks to identify the key financial determinants that affect financial strength ratings by extending the time horizons and categories in the dependent variables.

iii. The recent global financial crisis (2007 – 2009) resulted in an uneven impact on the insurers. Some insurers are severely affected by the crisis while some others remain steadfast (Eling and Schmeiser 2010 and Baluch et al 2011). The UK insurance industry is also affected by the crisis where the industry suffers decline in terms of their insurance density and insurance penetration levels. This effect is simplified in Table 1.2.1.

Insurance density (ID) is an indicator to measure individual spending on insurance product. Insurance penetration (IP) measures the importance of insurance activities relative to the size of the economy. Higher ID and IP values indicate better quality of insurance business. Both measures reflect the level of development of the insurance industry. As can be seen from Table 1.2.1, the industry recorded higher ID and IP in 2007 compared to 2014. There was a sharp decline in the ID reported in 2009, which is assumed to be caused by the financial crisis. Consequently, when individual spending

decreases, it would also affect insurance penetration levels. This study seeks to highlight the effect of the financial crisis as reflected in the rating changes and financial strength rating performance. It will provide a comparative analysis that captures financial performance before and after the financial crisis period. It is within the scope of the author's knowledge that this comparison specific to the insurance companies has not been attempted in any other studies.

Table 1.2.1

Insurance density and insurance penetration in the UK

For the year of 2007, 2009 and 2013.

	2007	2009	2013
Insurance density (ID)	$6,587.80	$4,578.8	$4,561.00
Insurance penetration (IP)	15.7%	12.9%	11.6%

Source: Author's compilation based on Swiss Re. Sigma Reports 2008 – 2014.

1.3 RESEARCH OBJECTIVES AND RESEARCH QUESTIONS

The aim of this study is to identify the determinants that influence the financial performance (FP) of insurance companies. It attempts to obtain an overall view of the financial performance of insurers, focusing on insurers licensed to operate in the UK. In particular, this study will examine four main research objectives:

i. To investigate the probability of changes in insurers' financial performance, as reflected in the rating transition analysis;

ii. To compare insurers' rating performance between both the pre-financial crisis and post-financial crisis periods;

iii. To identify which financial determinants have greater influence on financial strength ratings as reflected by the transition analysis; and

iv. To compare and contrast financial strength rating performance between two financial periods, viz. the pre-financial crisis and post-financial crisis.

Subsequently, the research objectives are constructed and aimed to answer the following questions:

i. What is the probability of a rating change?
ii. Does the rating performance differ between the pre-financial crisis and post-financial crisis period?
iii. Which financial determinants have the greater influence on financial strength ratings?
iv. Does financial strength rating performance differ between the pre-financial crisis and post-financial crisis periods?

1.4 SCOPE AND LIMITATIONS OF THE STUDY

This study aims to evaluate the financial performance of UK-based insurance companies. Specifically, this study attempts to assess the financial performance of UK life and general insurance companies in terms of its rating performance. Insurance rating is a powerful tool for decision-making since its assessment is based on various qualitative and quantitative criteria (Amin and Kamalkhani 2009). The motivation behind this selection is attributed to the nature of the general insurance business, which is known to transact short-term businesses. In doing this, the general insurers are exposed to a higher risk and the market itself is highly fluctuated and volatile. Another downside to the general insurers is that they have more short-term obligations to fulfill, due to the nature of the general insurance short-term contract and this could lead to a higher tendency of experiencing financial problems in the short-run.

The general insurance performance has shown a fluctuating trend since 1996, both in terms of its total net premium and the claims paid (ABI 2009). The UK general insurance performance is affected by the financial crisis (2007 – 2009), where it reported a 10% decrease in the net written premiums in 2009. In 2013, the UK general insurance market was still affected by the consequences of the financial crisis by showing a large cyclical decline in its premium (Munich Re. 2014). The decline further supports the argument that the general insurance market is exposed to a

higher risk, more short-term financial obligations and the tendency to experience financial problems.

The major limitation of this study is the sample size and access to the data. The success of this research depends on the availability of the insurance company financial data and rating reports. This study does not employ the data made available to public, but the one that is reported to the regulators, or the statutory reports. However, these statutory and rating reports are deemed private and confidential, and researcher has to spend tremendous effort, time and financial resources in order to gain access to the data required. This lengthy, time-consuming process and the confidentiality issue do affect the sample size. After the screening and cleaning data process, what remained was a small sample size which is restricted to companies with complete and available data for the period specified.

1.5 SIGNIFICANCE OF STUDY.

This study differs significantly from previous studies in two ways. Firstly, it employs the rating transition analysis on UK insurers and secondly; it analyses the differences in financial performance, as reflected in the rating grades. So far, previous studies have applied the rating transition analysis to evaluate large financial corporations, corporate bonds, banking institutions and sovereign credit quality. The focus of previous studies rests mainly on insurers in the US. Hence, this study attempts to extend the previous research by analysing the rating transitions for insurance companies operating in the UK.

This study aims to investigate the determinants of the financial performance of the insurance companies based on their financial strength rating performance. The rating transition analysis that is used demonstrates a significant degree of rating changes, as reflected in the rating fluctuations. The analysis is extended to determine the key financial determinants that could affect the rating grades or rating changes. Based on the empirical results, this study establishes that profitability, liquidity, size and organisational form are statistically significant determinants of the financial

performance of the insurance companies in the UK. This study recommends an alternative to measure the size of an insurance company, which is based on the gross premium written.

In addition, this study provides insights into the effects of the global financial crisis on the financial performance of the insurance companies. This is achieved by conducting comparative analyses that focus on two crucial periods of observation, namely the pre-financial crisis and the post-financial crisis periods. The comparative analysis attempts to provide better insight into insurers' financial performance, which is proxied by its rating performance. To the best of author's understanding, the comparative analysis has not been attempted in any other studies. Thus, this study seeks to fill the gap in the literature and discovers meaningful outcomes that could be beneficial to other parties.

1.6 OUTLINE OF THE THESIS

This dissertation consists of six chapters. A brief summary of these chapters and their contents is established below:

Chapter One: Background of the Research

This chapter contains the general framework for the thesis. It introduces and defines the chosen field of study which includes the introduction and motivation of the research, aims and objectives of the study and the main research questions. Subsequently, the scope of the study, its limitations and significance of the study will also be explained.

Chapter Two: Overview of the United Kingdom Insurance Industry

This chapter provides a brief introduction to the insurance industry in the United Kingdom. The aim of this chapter is to emphasise the importance of this industry to the nation's economy and to enlighten readers about the evolution of insurance in the United Kingdom from its inception to its current standing. A brief historical discussion is included as an introduction to the

industry. The discussion is followed by the industry's contribution to the United Kingdom's economy, players in the industry and the Supervisory authorities. Understanding the mechanics of the UK insurance industry is imperative to emphasise its importance and to justify the research attempts, which opt to evaluate insurers' performance.

Chapter Three: Literature Review

This chapter discusses the empirical and theoretical papers that have been conducted by other scholars. The chapter starts with the definition of key concepts, which are financial performance and financial strength rating. It is followed by general discussions on the issue and the basis for the theoretical framework that leads to the hypotheses' developments. The variables that have been used in other studies are also discussed. The justification for the proposed research is also included in this chapter.

Chapter Four: Research Design, Methodology and Theoretical Framework

This chapter explains about the research design employed in the study. The fundamental property of the database is explained thoroughly in this section. This chapter will also provide clarifications about the sample selection for the analyses and the justifications for the financial crisis breakpoint adopted in this study.

Subsequently, it also explains the theoretical foundations employed in the study. The discussion will be sub-divided into two parts – the first part will address issues related to the rating analysis (rating transition matrices) and the second part will discuss the financial strength rating analysis (regression analysis). The variables, hypothesis developments, estimation methods and models will be discussed in this chapter.

Chapter Five: Empirical Analysis and Discussions

This chapter focuses on the rating analysis to measure financial performance. The analysis, results, outcomes, interpretations and the discussions are presented in this chapter. There are two main parts of the analysis; the first is the rating transition matrices, and the second is the regression analysis. Subsequently, comparative analyses will also be included and discussed in this chapter.

Chapter Six: Conclusions and Recommendations

This chapter summarises and concludes the research findings and discusses significant contributions, practical implications and limitations of the research. Finally, it recommends an avenue for future research and ends with concluding remarks.

CHAPTER 2
OVERVIEW OF THE UNITED KINGDOM INSURANCE INDUSTRY

This chapter provides an overview of the United Kingdom (UK) insurance industry. The purpose of this chapter is to explain the evolution and development of the industry. In particular, this chapter highlights the history of the industry and its contributions to the UK economy. It will also discuss the players in the industry and the role of supervisory authorities. This chapter is intended to provide a fundamental understanding of the insurance industry, which is the central focus of this study.

2.1 A BRIEF OVERVIEW OF THE HISTORICAL BACKGROUND AND DEVELOPMENT OF THE INDUSTRY

Historically, the earliest insurance to be written in the UK was marine insurance, dated back in the 14th or 15th centuries and was pioneered by the Lombards (Hardwick and Gurguis, 2007). The Lombards were merchants from northern Italy, who brought marine insurance into general use by making it acceptable to the trading community and introducing proper rules and regulations (Martin 2005). The earliest practice of marine insurance was based on the firm basis of legal enactments and international regulations. This becomes the fundamental basis of insurance adopted in England.

Subsequent to this development was the introduction of life insurance contracts. The earliest one was written in the late 16th century; assuring the life of a merchant sailing with his goods (Hardwick and Gurguis 2007). Fire insurance was introduced in 1680; the first one was written by Phoenix Insurance Company (originally named the Fire Office). The Lloyd's of London was founded in the 17th century. It led to the formation of the Register Society in 1764. It is a register (record) of ships (aimed at both underwriters and merchants) to provide information on the condition of the vessels insured and chartered.

The industry that has been in existence since 1680s has now become one of the most-developed insurance industries in the world (ABI 2014). Table 2.1.1 provides a brief overview of the number of insurers operating in the UK insurance market over the last six years. These figures are compiled from annual reports published by the Association of British Insurers (ABI), known as the UK Insurance Key Facts. Even though it seems like a vast population, many of these insurers are subsidiaries of a large insurance company or financial service groups.

Table 2.1.1
Number of Insurers in the United Kingdom Insurance Market

Type of insurer/Year	2008	2009	2010	2011	2012	2013
General insurers	762	735	1005	1000	976	911
(FSA-Authorised)			(411)		(428)	(349)
(3rdNon Life Dir.)			(594)		(548)	(562)
Life insurers	209	193	309	300	285	387
(FSA-Authorised)			(129)		(109)	(210)
(3rd Life Dir.)			(180)		(176)	(177)
Composite insurers	46	44	n/a	n/a	n/a	n/a
Total	1,017	972	1,314	1,300	1,261	1,298

Source: Author's compilation based on the data obtained from Association of British Insurers (ABI) Insurance Key Facts 2008 – 2014.

The set of data in Table 2.1.1 shows that there were 1,298 authorised insurers in 2013, which is a slight increase compared to that of the previous year. From this number, 559 (i.e 349 general insurers and 210 life insurers) are UK-based insurers authorised by the Financial Services Authority (FSA) to transact insurance business (general and life insurers altogether) in the UK market. The other 739 (total numbers in parentheses, i.e 562 and 177) are non UK-based insurers authorised by the European Economic Area (EEA) and allowed to operate in the UK under the Third Life/Non-life Directives (3rd Dir.). These directives introduced a single authorisation system. According to the Directives, an insurer whose head office is in an European Union (EU) Member State is allowed to open branches and carry on business on a cross-border basis across the EU, under the financial

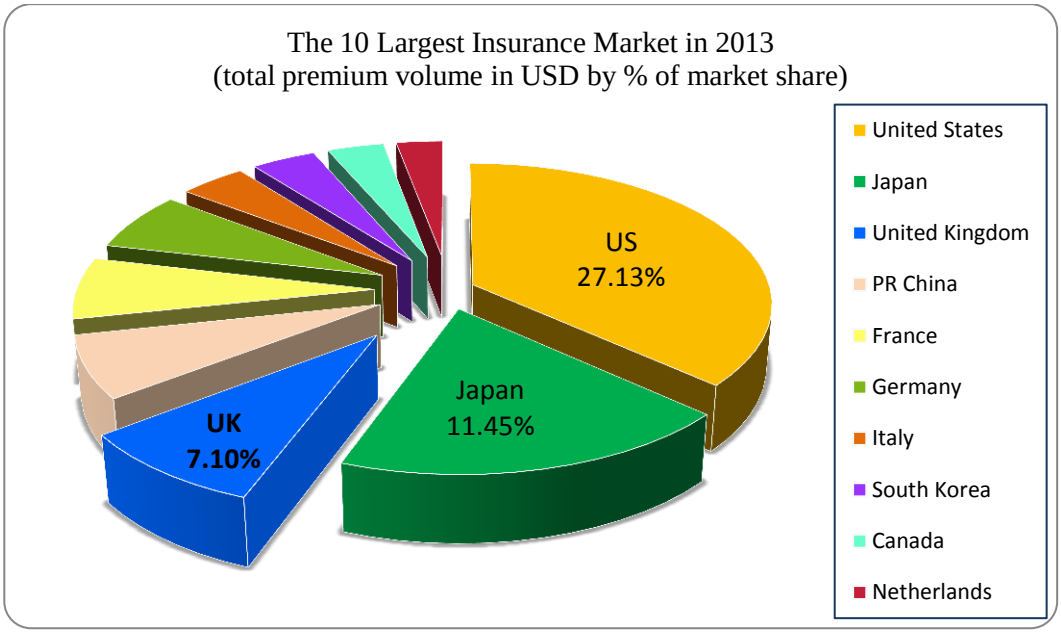
supervision of the Member State in which its head office is established (FCA, Lloyds).

The compiled data show a fluctuation in the number of insurers per year. The volatility is attributed to the restructuring in the market and among the players in the industry itself, mostly due to mergers and acquisitions. The market now becomes more concentrated, but the strength of the industry is not affected.

2.2 CONTRIBUTIONS TO THE UK ECONOMY

2.2.1 Performance in the Global Market and Overseas Trade

Figure 2.2.1.1
The ten largest insurance markets in 2013



Source: Swiss Re. Sigma No.3/2014.

In 2013, the UK insurance market generated approximately USD330 million in premium income, making it the third largest insurance market in the world and the largest in Europe. Figure 2.2.1.1 shows the ten largest insurance markets in the world. It is apparent that the United States dominates about 27% of the world market, followed by Japan and the UK. Another four European countries and two Asian countries are also performing well in the top ten leagues.

Narrowing this down by distinguishing between life and non-life businesses, the UK life insurance market is still the third largest in the world and the largest in Europe. Nonetheless, the UK general insurance market is the fourth largest in the world and the second largest in Europe.

Table 2.2.1.1

The Ten Largest Insurance Markets in 2013

Rank	Country	Total Premium (in mil. US$)	Changes (in %)	Share of world market (%)	Insurance Density (US$)	Insurance Penetration (%)
1.	United States	1,259,255	-1.06	27.13	3,979	7.5
2.	Japan	531,506	-15.19	11.45	4,207	11.1
3.	United Kingdom	329,643	2.37	7.10	4,561	11.5
4.	PR China	277,965	13.29	5.99	201	3.0
5.	France	254,754	7.22	5.49	3736	9.0
6.	Germany	247,162	6.34	5.33	2,977	6.7
7.	Italy	168,554	17.06	3.63	2,645	7.6
8.	South Korea	145,427	-4.94	3.13	2,895	11.9
9.	Canada	125,344	0.57	2.70	3,563	6.9
10.	Netherlands	101,140	5.51	2.18	6,012	12.6

Note: Changes (in %) are the differences in total premium volume between 2013 and 2012.

Source: Author's compilation based on data obtained from Swiss Re. Sigma No.3/2014 and OECD.StatExtracts

Table 2.2.1.1 further illustrates the strength of the ten largest insurance markets in the world. The main characteristics such as the total premium volume, its percentage of shares in the world market, the levels of insurance density and penetrations are highlighted in the table. Data in the table reveal that the United States, Japan and South Korea suffer decreases in their total premium volumes. Japan had reported the largest decline in 2013, when they faced a 15.19 % decrease in premium volume, thus affecting their share in the world market.

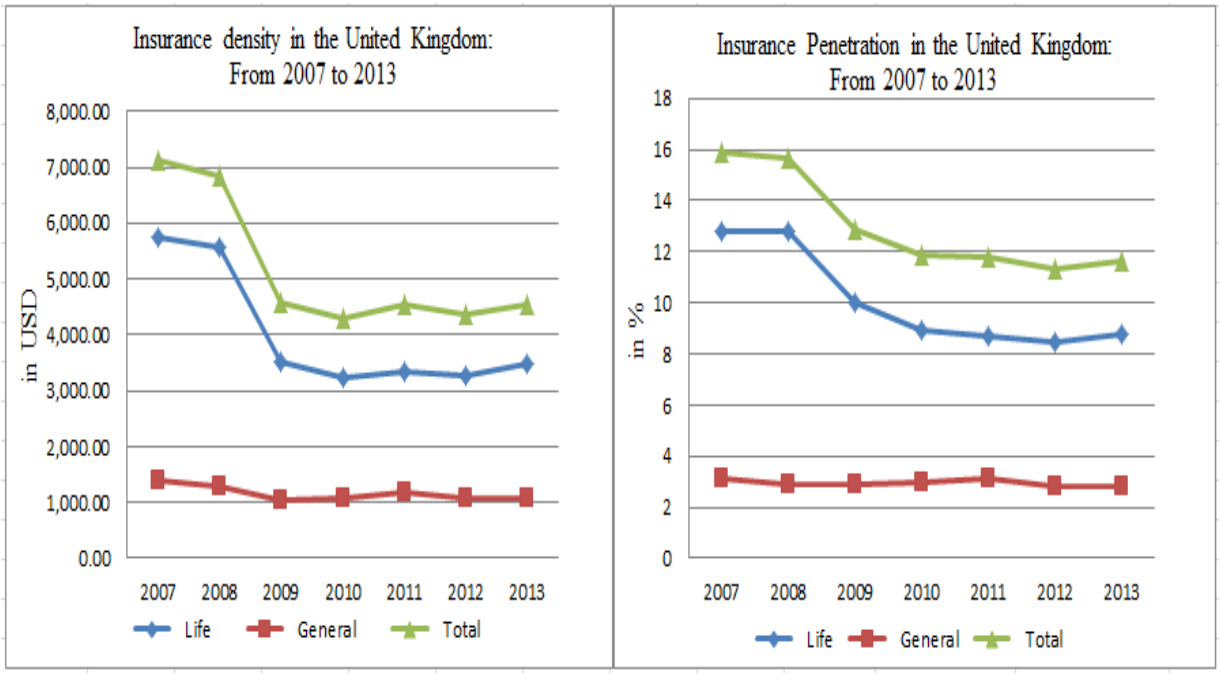
On the other hand, the United Kingdom and the rest of the countries on the list are doing well, each demonstrating a rise in their total premium volume. Based on the data, Italy shows remarkable performance with an approximate of 17% increase in its total premium volume. The People Republic (PR) of China also reflects a high premium volume increase while Canada has a very slight but positive change (0.57%) in its total premium volume over the year.

Another way of comparing the performance of the UK insurance industry relative to the others is by explaining two parameters known as the insurance density and insurance penetration (Cristea et al 2013 and Roy 2014). These two measures signify the level of development of the insurance industry of the nation. Insurance density refers to the level of premiums per person or the per capita premium. It is measured as the ratio between the total insurance premium (in USD) to the total population (Beck and Webb 2003). This ratio reflects the population's average spending on insurance. On the other hand, insurance penetration measures the importance of insurance activity relative to the size of the economy. It is a ratio of premium volume to the Gross Domestic Product (GDP), as reflected in local currency. A higher insurance penetration level signifies higher quality of insurance business.

The insurance density (ID) and insurance penetration (IP) in the UK are further illustrated in Figure 2.2.1.2. The charts reflect insurance density and penetration according to the type of insurance businesses, which are life and general insurance, and also the total of both life and general insurances. From the density data, it is apparent that the UK population spends more on life insurance products. This is also reflected in the higher insurance penetration levels which signify that life insurance activities are more dominant in the UK economy. This might be a good indicator that there is a higher level of awareness among the UK population of the importance of life insurance, both as protection and financial saving mechanisms.

Figure 2.2.1.2

Insurance Density and Insurance Penetration in the United Kingdom
From 2007 to 2013



Source: Author's compilation based on data obtained from Swiss Re. Sigma reports (2008 to 2014)

In Figure 2.2.1.2, the levels of density and penetration depict the fluctuating trends over the years before it started to rise gradually in 2013. There was a sharp fall from 2008 to 2009, which is during the global financial crisis (2007 – 2009). The decline could be associated with the impact of the global financial crisis that affects the insurance markets worldwide. Life insurance expenditure shows a larger decline that significantly influenced the total figures. Surprisingly, general insurance manages better throughout the years. There are fluctuations over the years, but their magnitudes are smaller compared to those of the life business.

2.2.2 Contributions towards UK employment

Another important contribution to the economy is that the industry is a major employer, accounting for more than 25% of all financial intermediation jobs and about 3.6% out of all UK employment (Maer and Broughton 2012). In 2013, there were 1,169,000 employments in

the financial and insurance services industry, of which 314,000 were jobs within the insurance industry itself (ABI 2013). Out of this number, 118,100 were insurance specialist jobs and 196,200 insurance auxiliary jobs. Insurance specialist jobs refer to individuals who are involved in and working directly in insurance, reinsurance and pension funds businesses. On the other hand, insurance auxiliary jobs include brokers, loss adjusters and employees in the legal professions.

Currently, job opportunities for the insurance auxiliary position are increasing yearly (ABI 2014). This suggests a better recognition of the importance of having good personnel, professionals and skilled workers to handle the complexities of insurance activities. However, with the rapid development of information technology in the industry, it is predicted that the number of employments will decline in the future (Stern 2011).

2.2.3 Contributions to the UK savings and investment market

Two prominent functions of insurance services to the nation's wealth are to promote financial stability and to facilitate and mobilise savings. The financial stability provided by insurance services by means of insurance compensation is indeed essential. It encourages individuals and organizations to create wealth with the guarantee that their resources are protected.

Insurance services help to mobilise savings by channeling it into domestic investments. It helps to enhance the efficiency of financial systems by reducing the transaction costs by bringing together savers and borrowers. This is done by investing the premiums paid by policyholders as loans to businesses or other ventures. In this instance, insurance acts as an intermediary for individual policyholders and helps to omit the costly, time-consuming tasks of direct lending and investing. Insurance services also help to create liquidity by investing the premium funds in long-term loans and

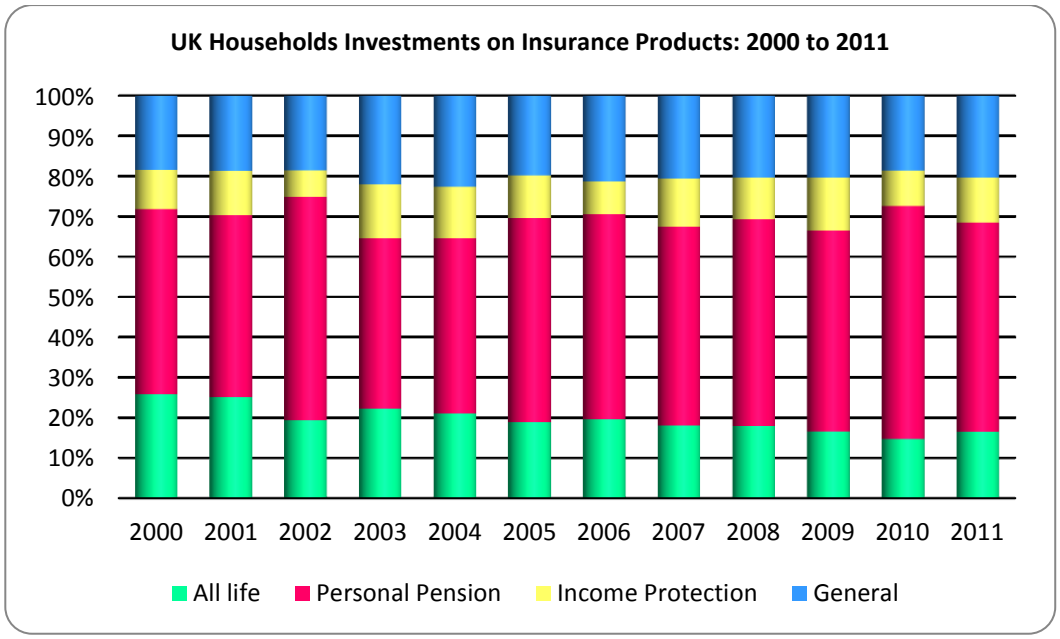
investments. A policyholder's right to immediate access to loss payments and savings remains intact, and borrowers are given tenure for loan payments. Thereby, it reduces the illiquidity inherent in direct lending.

UK insurers play a major role in the UK's savings and investment market. It facilitates savings that allow individuals to make better and more economic choices about the present and future levels of consumptions and savings. For instance, pension is a good savings element where people save while being in employment in order to create a retirement fund. This fund would then be used for consumption during retirement. These pension funds are accumulated and then invested, therefore promoting economic growth.

Evidence of this concept is shown in Figure 2.2.3.1, where the chart illustrates the total amount of personal wealth invested in insurance products over a decade, starting from 2000 to 2011. The total amount is segregated into four major insurance products -life insurance, personal pensions, income protection and general insurance. The "general" category includes any insurer-administered funds that are not categorized as life and pension business, income protection and life insurance companies' reserves.

It is apparent in Figure 2.2.3.1 that the major bulk of the investment comes from personal pensions. Insurer-administered personal pensions are contract-based pension schemes that can be arranged by an individual or by an employer, where the insurer and policyholder have a direct contractual relationship.

Figure 2.2.3.1
Amount Invested in Insurance Products in the United Kingdom
From 2000 to 2011



Source: Author's compilation based on reports published by the Association of British Insurers.

Examples of personal pension schemes are individual pensions, group personal pensions, stakeholder pensions and pension annuities. As shown in the graph, more than 30% of the total investment per year is in terms of personal pensions. Subsequently, consumers also invested in income protection products. Accordingly, these two products have influenced the total amount invested in insurance products over the 10-year period. These funds are channeled into investments, providing an important source of funds for both UK and overseas businesses and also for the public sector. Insurers will focus on profit maximization; thus promoting economic growth, more efficient capital allocation and enhance economic performance.

2.3 THE MAIN PLAYERS IN THE INDUSTRY

According to Hardwick and Gurguis (2007), the ownership structure of the UK insurance companies is complicated. The industry is dominated by several large groups, which are made up of more than one legal entity. As an example, the Royal London Mutual Group consists of Refuge Assurance, Scottish Life Assurance and United Friendly Life Assurance. The ownership structure itself varies, where the two most prevalent forms are stock (proprietary) and mutual insurers. The stock insurers are registered and governed under the Company Act and are owned by stockholders. These companies are similar to any other publicly-traded companies, able to trade shares on an exchange and are required to report earnings on a frequent basis. On the other hand, the mutual companies are owned by policyholder members.

There are also proprietary companies known as “bancassurers”. These are banking or building society groups that have expanded into the insurance business. Its formation is mainly through joint ventures and acquisitions which enable the bank or building society to utilise insurer’s expertise in developing their operations. There are other types of organizations authorized to supply insurance in the UK such as captive insurance companies, reinsurance companies, the London Insurance Market and Lloyds of London.

Table 2.3.1 presents a summary of the UK’s twenty largest insurance companies in 2012 and 2013. The rankings are downloadable and published on the Association of British Insurers (ABI) website. The assessment is based on the total net premium written (NPW) reported by each company.

Table 2.3.1
Top 20 UK General Insurers from 2010 to 2013

Ranking					Total Net Premium Written (£ m)			
2010	2011	2012	**2013**	**Company Name:**	2010	2011	2012	**2013**
2	1	1	**1**	Aviva	4,102	4,429	4,653	**4,522**
1	2	2	**2**	Direct Line Group	4,420	3,447	3,262	**3,055**
3	3	3	**3**	AXA	2,877	2,854	2,937	**3,043**
4	4	4	**4**	RSA Group	2,723	2,851	2,825	**2,725**
11	6	7	**5**	Ageas	867	1,721	1,583	**1,946**
6	5	5	**6**	Allianz	1,564	1,831	1,788	**1,880**
5	7	6	**7**	BUPA	1,626	1,663	1,670	**1,678**
7	8	8	**8**	LV=	1,109	1,365	1,443	**1,388**
9	10	9	**9**	National Farmers Union	926	1,089	1,104	**1,116**
10	13	12	**10**	AIG	1,020	1,022	946	**1,062**
12	12	10	**11**	British Gas Insurance	813	1,029	1,057	**1,036**
14	14	14	**12**	QBE Insurance	574	728	798	**934**
8	11	11	**13**	Lloyds Banking Group	1,109	1,031	974	**899**
15	9	13	**14**	Zurich Insurance	549	1,155	889	**822**
18	16	16	**15**	esure	441	483	482	**485**
(-)	(-)	17	**16**	Admiral Group	(-)	(-)	439	**411**
16	15	15	**17**	Cooperative Insurance	547	639	526	**410**
(-)	(-)	18	**18**	Simplyhealth	(-)	(-)	347	**393**
(-)	20	(-)	**19**	Prudential	(-)	357	339	**364**
(-)	(-)	(-)	**20**	Legal & General	(-)	(-)	332	**360**
(-)	17	(-)	**(-)**	Aspen Insurance	(-)	419	(-)	**(-)**
17	18	(-)	**(-)**	Groupama	442	409	(-)	**(-)**
19	19	(-)	**(-)**	Brit Insurance	384	368	(-)	**(-)**

Source: www.abi.org.uk

Based on Table 2.3.1, the rankings given to general insurers show lesser fluctuations between 2012 and 2013. The top four insurers (Aviva, Direct Line, AXA and RSA) remain steadfast at their current rankings. As of experiences, Aviva and RSA have been established for more than 200 years (Post Magazine 2013), while several others also have very long-standing business operations. This is indeed a positive indication of their strength and survival in the industry with vast experiences over time, which allows them to withstand cycles in the industry yet able to be at the top of the league. At the end of the list, there are three insurers that are included in the 2010 and 2011 rankings but then excluded in the later years. The exclusion might be due to decline in their NPW, which serve as the basis of the ranking process.

On the other hand, the top twenty life insurers (Table 2.3.2) show fluctuating trends in their ranking. Standard Life remains at the top of the league with an increase in its total net premium in each and every year from 2010 to 2013. However, the rest of the companies in the list experienced ranking changes. Aviva Plc. reported decreasing total NPW and fell into the third place in 2013. Almost all other insurers that suffer ranking downgrade show visible decrease in their NPW. Phoenix Group Holdings show remarkable performance in terms of its NPW, thus the company is included in the 2013's top 20 insurers.

Table 2.3.2
Top 20 UK Life Insurers from 2010 to 2013

Ranking					Total Net Premium Written (£m)			
2010	2011	2012	**2013**	**Company Name:**	2010	2011	2012	**2013**
2	2	1	**1**	Standard Life	7,610	8,361	9,678	**11,703**
3	5	4	**2**	Lloyds Banking	6,407	5,878	7,159	**8,398**
1	1	2	**3**	Aviva plc	9,256	8,697	9,351	**8,273**
4	4	5	**4**	Legal & General	6,201	6,149	6,867	**6,939**
5	7	7	**5**	Aegon NV	5,187	4,558	5,252	**6,030**
6	3	3	**6**	Prudential	4,954	6,592	8,313	**5,369**
7	6	6	**7**	Friends Life	3,431	4,927	6,044	**4,571**
10	10	10	**8**	Royal London	2,230	2,411	2,997	**3,766**
14	11	11	**9**	Pension Insurance	588	1,359	1,512	**3,664**
(-)	(-)	13	**10**	FIL Ltd	(-)	(-)	1,337	**2,698**
8	8	8	**11**	Zurich Financial	3,296	3,369	4,937	**2,692**
9	9	9	**12**	Old Mutual	2,455	2,983	3,337	**2,450**
(-)	17	18	**13**	Swiss Re	360	537	1,183	**1,892**
(-)	15	14	**14**	Rothesay Life	(-)	968	1,282	**1,670**
13	14	20	**15**	Canada Life	921	1,022	944	**1,347**
19	19	17	**16**	Just Retirement	422	514	1,195	**1,344**
12	12	15	**17**	Liverpool Victoria	1,009	1,154	1,230	**1,180**
16	16	12	**18**	Partnership Life	491	913	1,468	**1,160**
(-)	18	(-)	**19**	HSBC Holdings	391	515	847	**771**
(-)	(-)	(-)	**20**	Phoenix Group	(-)	(-)	(-)	**672**
18	20	(-)	**(-)**	UNUM Group	430	434	(-)	**(-)**

Source: www.abi.org.uk

Another key indicator of their performance lies in the choice of distribution channels, looking at their strategies to penetrate the market. In 1999, most insurance transactions were done through brokers/agents and none through direct sales. However, the trend changed following the boom of information

technology. Now, most companies are utilising direct sales as their main channel of distribution. In 2007, a third of insurance sales were generated through direct sales, which was at par with sales generated by brokers/agents (ABI 2007, ABI 1999). This is another evidence of the effectiveness of direct sales as a distribution channel. Direct sales refer to the use of their own sales force at branch offices or mostly through telephone or online contacts. In direct sales, there are no intermediaries involved. By eliminating the use of the insurance intermediary, the process to obtain insurance cover becomes quicker, easier and cheaper.

Despite the complexities of the structure, these companies could be classified according to their line of businesses; the main two are life and health insurances and general insurance, all of which are briefly explained as follows:

2.3.1 Life and health insurance market

The life insurance business in the UK offers a range of varied products. These include life insurance, individual pension products and occupational pension products. It also offers general annuities, pensions and income protection policies. A statistical analysis conducted by ABI shows that the total net written premium of UK's life insurance market in 2012 was £63,000 million, almost 3% increase from the previous year. Out of this amount, about 57% were dominated by the top five life insurers. The five most dominant players in UK's life insurance market are Standard Life, Lloyds Banking Group, Aviva, Legal & General and Aegon NV.

2.3.2 General insurance market

General insurance or non-life insurance market consists of any insurance company that is not determined to be life insurance. The fundamental concept of general insurance coverage is to provide payment or compensation based on the occurrence of loss of a particular loss (financial) event. In the US, the general insurance companies are known as property and casualty insurance companies.

In the UK, the general insurance market is broadly diversified into three areas that are the personal lines, commercial lines and London market. Personal lines insurance policies are developed as mass productions. It includes autos (private cars), homeowners (households), pets, creditors, travel insurance and others. Commercial lines insurance products are usually targeted at small legal entities. The policy covers workers' compensation (employer's liability), public liability, product liability, commercial fleet and other general insurance products suitable for most organisations. The London market insures large commercial risks such as supermarkets, football players, and other very specific risks. It consists of a number of insurers, reinsurers, brokers and other companies that are typically located in the City of London. It also participates in personal and commercial lines, domestic and foreign through reinsurance.

In the UK, the top 5 general insurers are Aviva, Direct Line Group, AXA Insurance, RSA Group and Ageas. These five insurers conquered about 47% of the total net written premium in 2012. As reported in ABI 2013's database, the most sought after general insurance product is the private motor insurance, which signifies its product share of about 26%. A plausible justification for this high figure could be related to the fact that motor insurance is compulsory to all motorists and vehicle owners in the UK. On the contrary, commercial property insurance recorded 7.4% out of the total net premium written for general insurers.

2.3.3 Other Categories of Insurance Companies in the UK

Captive Insurance Companies

Captive insurers can be simply defined as wholly-owned insurance subsidiaries of a non-insurance organization (the parent company). A captive primary function is to provide cover or to insure some or all the risks of its parent. Captive insurers can be categorized into many types such as single-parent captive, diversified captive, association

captive, agency captive, rent-a-captive and special purpose captive. Captive insurers are mostly established in offshore domiciles, to name a few established domiciles such as Bermuda, Cayman Island, Guernsey, Isle of Man and Luxemborg. This market is evolving in terms of its numbers and more domiciles like Vermont, British Virgin Island, Gibraltar and Dublin (Hardwick and Gurguis, 2007) are now available for captive operations.

Reinsurance Companies

Reinsurance companies act as "the insurers for insurance companies". These companies assist in eliminating the possibility of large losses from any occurrence experienced by insurance companies. It also enables insurers to accept individual risks beyond their limit (or, in excess of their limit). Several big names in the UK according to the net written premiums in 2009 are Munich Re ($18,654 million), Swiss Re ($11,883 million), Lloyds ($8,489 million), Hannover Group ($7,495 million) and Allianz SE Reinsurance ($5,107 million).

London Insurance Market

Herve-Bazin (1994) conducted a survey to establish a list of requirements for a successful international centre. His survey involved insurance centers in Europe, North America and Asia which are compared against twelve criteria. Some of the criteria which qualify it as an international centre are political stability, geographical location, developed communication system, highly qualified personnel, multilingualism, stable legal and regulatory environment and liberal authority attitude. Based on his investigation, he concluded that only London is qualified as an international insurance centre, as it complies with all the criteria listed. He also included several secondary advantages by looking at strong currency and strong international network links. As with the London market, its strong alliance with the United States is indeed a strong network link and a positive attribute.

The London Insurance Market is a part of the UK insurance industry that manages tradable insurance and reinsurance internationally. It encompasses almost all general businesses and predominately high-exposure risks. Its main players are large international insurance companies and Lloyd's syndicates. As one of the world's largest international insurance market, the strength lies within the skilled workforce and concentrated skilled support services, the number and concentration of insurance companies and its proximity to Lloyd's. In addition, the innovative underwriting and open approach to regulation are also an added advantage in the market. According to Herve-Bazin (1994), the London Insurance Market conquers the global market in two lines of business namely the marine, aviation and transport market and the London market reinsurance sector.

Lloyds of London

Lloyds of London can never escape the discussion revolving around the UK insurance industry. It is an insurance market in its own right. It plays a major role in the industry, and its reputation as one of the oldest and most historical insurance institutions in the world is indisputable. The following part gives a brief insight about Lloyds of London.

2.4 LLOYDS OF LONDON

2.4.1 Historical Background and Its Evolution

Lloyds of London is best known as one of the oldest and most historical insurance institutions, with more than 300 years of operation to its name (James 2007). The institution, which is originated from a coffee shop in 1688, has now been the world's oldest and most distinguished insurance marketplace. It started out as Edward Lloyd's Coffee House, which is an informal place in which insurance business took place. At that time, up until the early 20th century, the insurance contracts revolved around marine cargo, hull and war risk insurance.

Lloyds diversified its business in 1887, encompassing property risks in addition to the marine insurance business. The official Lloyds was launched in 1774, with 79 members comprising of merchants, brokers and underwriters. Each member contributed to the process of obtaining a premise for their operation, which started in a Room at the London Royal Exchange (Lloyds Fact Sheet 2009). Its operations were officiated in 1871 where membership was formally regulated, and the election committee was given more authority to control its operation (Herschaft 2005).

The evolution continued throughout the 20th century. Nowadays, Lloyds is known as the world's best insurance marketplace, home to some of the most skilled and experienced insurance experts. Lloyds is also known for its innovative efforts in insuring unique risks and creating new coverage areas such as kidnap and ransom, space and aviation, cyber-liability, contingency coverage for large international and national sporting events and even terrorist threats.

Lloyds has also had its fair share of misfortunes. It faced major losses in the mid- 80s and early 90s due to a series of catastrophic events including the Piper Alpha oil spillage, hurricane Andrew and massive asbestos claims (Carter and Falush 2009, and James as cited in Cummins and Bernard 2007). This led to the implementation of the 1996 Reconstruction and Renewal Plan. It is aimed at rebuilding the market. The by-product of this is the Equitas Reinsurance, which provided an opportunity for Lloyds members to run-off their pre-1992 liabilities and current and new members to trade forward. Equitas is a completely separated entity from Lloyds.

2.4.2 Lloyds as an insurance marketplace

As a key player in the British insurance industry, Lloyds is essentially different from any other conventional insurance companies. It is not an insurance company or it does not write insurance business BUT it is an insurance marketplace that provides accommodation and

services for members to conduct insurance transactions (Herschaft 2005 and Carter and Falush 2009). It is also regarded as a partially mutualised market where its members unite as syndicates to insure risks (Lloyd's Highlight 2009).

The uniqueness of Lloyds lies in its formation as an insurance marketplace. It has diverse markets, expanding across the market portfolio, size and structure of market participants. Lloyds is also known for its characteristics as a specialist insurance market. It is famous as the initiator of great policies. The first marine, aviation, motor, satellite and reinsurance policies were all transacted at Lloyds during the 19th and 20th century. This led to the development of innovative and unique insurance products such as coverage against computer hacking attacks, intangible assets and intellectual property risks.

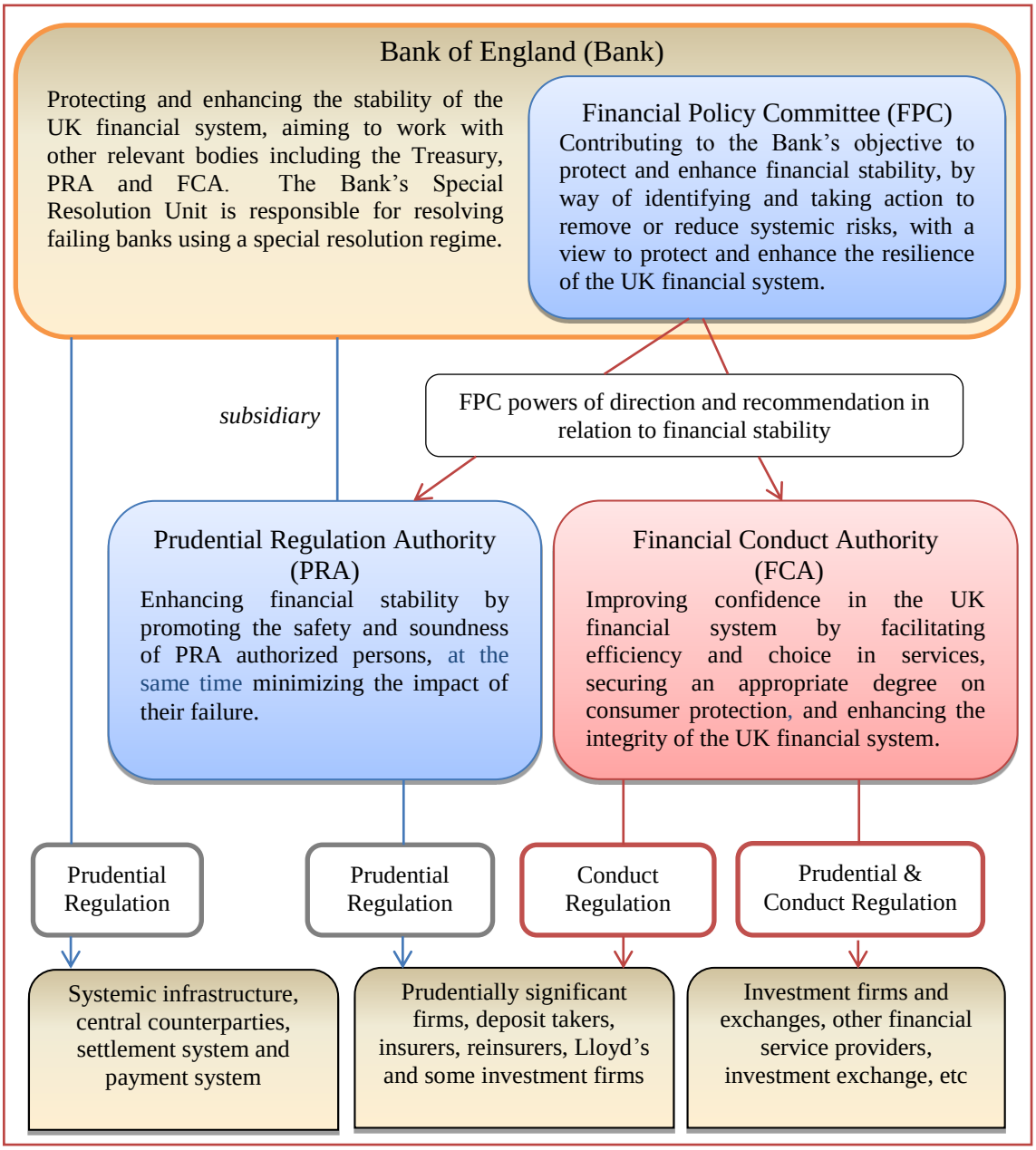
In terms of capacity, Lloyds operates on the basis of unlimited liability, backed by the personal wealth of its members (aggregation of Names without limit). Its unlimited liability is also supported by the Lloyds Central Fund (in 2006, it reported a £2,054 million in excess of technical reserves) and was guaranteed by the American deposits, providing additional security to policyholders (Carter and Falush 2009). It was estimated that corporate members provide 90% of Lloyds' market capacity. Each member must be able to show its ability to support Lloyds' total underwriting business by holding sufficient capital. Lloyds implements a risk-based capital system, which is an assessment system based on market average performance. Recently, they switched to the Individual Capital Assessment system in order to align capital and risk in a more efficient way.

2.5 SUPERVISORY AUTHORITIES

The structure of insurance supervisory authorities has been subjected to many reforms. These changes are focused on improving the current structure and strengthening the taskforce. Policy reforms, re-regulations and improvements have been implemented in reactions to the financial crisis in 2007-2008 (Véron 2012). In the UK itself, the most recent reform was announced in the Financial Services Bill Jan.2012, which outlined the foundations for the new proposed regulatory regime. HM Treasury does the groundwork for the restructuring, together with the Bank of England (Bank) and the Financial Services Authority (FSA). These three bodies are the main authoritative bodies and have been involved in the UK insurance supervision and regulations since their inception.

Prior to this new reform, the prudential and conduct business unit is designed and placed as one unit under the responsibility of the FSA. The new structure, however, focuses on regulating the insurance industry at macro and micro prudential levels. The Financial Policy Committee (FPC) in the Bank is responsible for macro-prudential supervision, which focuses on persevering financial stability. It has the power of direction over micro-prudential regulators, which are the Prudential Regulation Authority (PRA) and Financial conduct Authority (FCA). Under the new structure, the PRA will be a new subsidiary of the Bank while the FCA will remain as an entity under the FSA and will be reporting directly to the HM Treasury and Parliament. As a subsidiary of the Bank, the fundamental principle of the PRA is to enhance the financial soundness of insurers. The PRA has to ensure that insurers can fulfill their financial obligations in terms of claim payments. On the other hand, the FCA is responsible for protecting and ensuring fair treatments of customers (Adams 2013).

Diagram 2.5.1
Roles of the bodies in the new regulatory structure



Source: HM Treasury Report (February 2011) and Chartered Insurance Institute: Policy Briefing April 2013

According to the new regulatory structure, insurers, reinsurers and Lloyd's are subject to dual-regulation, whereas insurance intermediaries will be regulated only by the FCA (Whear et al 2013). The dual-regulation system should provide better solutions for supervising the insurance industry. It empowers the Bank to focus specifically on the safety and soundness of insurance companies and the FSA to concentrate on consumer protection. The outcome of this dual-regulation is beneficial to both insurance

companies and policyholders, where all parties to the insurance contract are protected against financial insolvency and unfair business practices.

The new regulatory reform was enacted on April 1st, 2013. Upon its inception, it allocated six month's transition period for insurers to change their regulatory status disclosure. However, the enactment of this new reform triggered concerns among the insurers (ABI 2012). First of all, the transition period of six months is deemed insufficient and restricted. The proposed transition period should consider the complexity and volume of works that firms will have to undertake in order to comply with the new regulation. It involves various amounts of documentation for each and every product, and this is indeed a tedious and time-consuming process. Besides documentations, insurers also have to make changes to their IT system. The changes involve mapping, developing, testing and refining phases which definitely take more than six months to complete. Thus, a longer time frame is necessary and more reasonable in order for insurers to comply with the regulation.

Apart from the time restriction, another main concern that could hamper insurer's compliance in this matter is the cost involved in the transition process. In their cost benefit analysis, FSA estimated that the cost incurred in the process is around £100 to £2,500. However, the real scenario is very different. ABI (2012) reported that an insurer who experienced documentation changes incurred the cost of approximately £500,000. In addition, another insurer spent £1.7m to make changes to the IT system, customer communications and marketing materials in order to accommodate changes in their product lines. It is clear that this transition process will trigger higher cost than the amount anticipated by the regulator.

Both issues, which are the transition period and cost incurred are inter-related. The cost could be reduced if the transition period is extended. For instance, if the timescale is lengthened into 12 months, the marketing and communication cost will be reduced as it can be incorporated into the annual business review cycle. A longer timescale will also help to reduce the

amount of outdated material which will need to be destroyed. After a year of establishment, the new regulatory reform is still being reviewed and refined in order to accomplish its objectives.

2.6 SUMMARY OF UK INSURANCE INDUSTRY

After more than 300 years of operations, the UK insurance market has grown to become the largest in Europe and the third largest in the world (after the United States and Japan). In the UK itself, the industry is a major contributor to the UK economy and its tax take, which totaled up to £8.2 billion in the latest tax year. It controls 13.4% of investment in the London stock market; with a major portion of investment in pension funds compared to other financial institutions such as banks and unit trusts.

In addition, the insurance industry contributed a significant amount of income derived from its overseas business, which accounted for one-fifth of the net premium income, a total of £54 billion (£41 billion from long-term business and £13 billion from general business). The insurance industry is also one of the major employers, offering job opportunities in various areas and expertise. The latest regulatory reform, which introduced dual-regulation of insurers, brings the UK in tandem with international regulatory practice.

The industry has also suffered shortcomings and problems. The recent outlook highlights that the industry is experiencing uneven economic recovery and is still susceptible to the risk of recession (Crawford et al 2014). Subsequent to the Solvency II regulation, the UK insurance industry is subject to the evolvement of regulatory reform. The pressure of dual-regulation is unavoidable. FCA's thematic reviews challenge many firms' current business models, while the PRA focuses on risk management and solvency. One of the PRA's requirements is to evaluate insurer's financial strength by judging its solvency. Some of the criteria to be measured include the quality, location, amount of capital, internal capital models, liquidity, funding and performances during financial distress. In addition, UK insurers are further challenged to implement the Financial Reporting

Standard 102, to replace the current UK's generally accepted accounting principles (GAAP) in 2015.

Insurers have always been subjected to a complex regulatory environment, but changes in recent years increase the levels of complexity. Hodgson (2013) criticizes that all these regulatory reforms will impede the diversity and flexibility on a competitive insurance industry. He agrees that greater focus should be placed on mitigating insolvency risk among insurers. However, in doing so, the level of capital requirement has been increased which could exceed insurer's financial capacity. The impact of higher capital requirement is more severe to insurers with smaller financial capacity. If they fail to comply with the capital requirement, they will be forced to exit the industry. This, together with market pressure will affect the outcome of the industry. In addition to the regulatory reforms and political uncertainty, insurers are also subject to other challenges due to volatility of the global financial markets, slow recovery and double-dip recession, emerging technologies and terrorism (Hodge and Michel 2014).

As a conclusion, the UK insurance industry remains a strategically important player in the UK financial system. The industry is recovering from the recent financial turmoil which is evident from the slow rise in the total premium volume in 2013. This is also apparent in the increase in both the insurance density and insurance penetration. Insurers should adopt a holistic approach to deal with changes and challenges in the industry, where this will create competitive advantage and cost saving advantage. Success and longevity in the industry depend on the ability of each insurer to restructure and simplify their organizations in order to create more efficient operations that can take advantage of emerging growth opportunities.

CHAPTER 3
LITERATURE REVIEW

This chapter reviews the literature concerning the financial performance by insurance companies. The chapter starts with a brief overview of the definition of key concepts in the study. This is followed by a general review of the subject matter in order to identify the gap in literature. This chapter will also include discussions on the approaches and models that have been used to measure financial performance and determinants of financial performance, which become the basis for the theoretical framework and hypothesis development. Since this study attempts a comparative analysis between two different periods, the justification for the selected periods and its breakpoint will also be reviewed. Justification of the proposed research is also provided at the end of the chapter.

3.1 DEFINITION OF KEY CONCEPTS

3.1.1 Defining Financial Performance

Scholars have been trying to find a universal definition of FP. Previous studies have seen FP being defined in many ways; from a neutral definition to an extreme definition. Currently, there is no ultimate definition of FP. There have been many attempts to define FP but most of them seem to fit only a particular theme of research or usage (Allen and Wood 2006). Burca and Batrinca (2014) argue that despite the various models that could be used to analyse financial performance, there is no consensus on a valid definition and quantification of this concept. In addition, scholars believed that a single target variable could not be found for defining FP (Crockett 1997, Houben and Kakes 2004 and Schinasi 2004).

Allen and Wood (2006) investigate the ultimate definition of FP, which was first introduced in 1994 as “financial stability” by the Bank of England. They conclude that there is still lack of a widely-accepted definition. In addition, the concept of stability is deemed slightly vague and difficult to define (Heikensten 2004).

The concept of “financial performance” has been interchangeably used with other terms such as “financial strength”, “financial solvency”, “financial health” and “financial stability”. These various terms are simply the operationalised measures of FP and do not infer a failure or possible failure of an insurer (Chen and Wong 2004).

Earlier research has tended to focus on the concept of “financial insolvency” to measure the FP of an insurance company (Browne and Hoyt 1995, Carson and Hoyt 1995, Pottier 1998 and Pottier and Sommer 1999). However, the financial insolvency concept is rather rigid and is not suitable for universal application (Kramer 1996 and Sharpe and Stadnik 2007). Cases of insurer insolvency are more prominent among US insurers during the late 80s and 90s, thus financial insolvency is regarded as a country-specific definition.

On the other hand, financial strength has been broadly described as stability in the general level of prices, the efficiency of performing key economic functions and periods of profound structural change (Duisenberg 2001 and Bundesbank 2003). Mishkin (1992) and Issing (2003) agrees that financial strength is represented by the prevalence of a financial system which is able to endure in a lasting way, without major disruptions and efficient allocations of savings to investment opportunities. Correspondingly, it has also been interpreted as the robustness of the financial system and its ability to withstand disturbances and shocks in the economy without giving way to cumulative process and preventing them from having a disruptive effect on their system (Wellink 2002, Padoa-Schioppa 2003 and Bundesbank 2003).

However, due to the strenuous effort in finding a single, ultimate definition of FP, some scholars opt to define it by defining the opposite, which is the financial instability. In this instance, financial instability is referred to as financial market conditions that harm, or threaten to harm the economy’s performance through their impact on

the working of the financial system. It is also defined as a situation in which economics performance is potentially impaired by price fluctuations or the inability of financial institutions to meet their contractual obligations (Crockett 1997, Chant 2003 and Ferguson 2003).

Hence, it could be assumed that FP is a complex matter, even at its definition. Without an ultimate definition, the most neutral and acceptable approach to defining FP should be flexible and can be adjusted to suit particular needs. By looking at all possible definitions of FP, it could be concluded that there are two broad perspectives of an acceptable definition. FP can be defined neutrally to suit into a particular research theme, or it can be defined holistically, by combining all extremes. Thus, by looking at a holistic approach, FP can be defined as the robustness of the system, the efficiency of key economic functions and the absence of threats or harms that can impair financial performance.

3.1.2 Defining Financial Strength Ratings (FSR)

Financial strength ratings (FSR) are defined as comprehensive measures of risk because they include all of the relevant risk factors associated with financial strength rating determinants (Florez-Lopez 2007). In short, FSR represents an overall assessment of an insurer's creditworthiness (Frydman and Schuermann 2008). In addition, FSR provides insights into insurer's financial strength and capacity to fulfil their on-going obligations to the policyholder (Wang 2010, Eckles and Pottier 2011 and Doherty et al 2012).

These ratings, together with the financial and non-financial information obtained during the rating process can become a powerful tool to assist decision-making for the stakeholders. This is attributed to the nature of the rating assessment that encompasses multiple aspects of a firm (Amin and Kamalkhani 2009). However, the rating process is not totally transparent, and their analysis and determinants

are not available to the public. Thus, it becomes a constraint for stakeholders to manipulate and use the rating information (Estrella et. al., 2000).

The importance of FSR for an insurer varies according to the type of the insurance buyer. Epermanis and Harrington (2006) demonstrate that insurance ratings are imperative and directly influence buyer's purchasing decision. FSR is also the main source of buyers' information about the financial quality of insurers, thus buyers are willing to pay higher prices to obtain insurance covers from an insurer with higher ratings (Kartasheva and Park 2012). These findings are consistent with findings from past studies (Sommer 1996 and Cummins and Danzon 1997), which establish that insurance price is positively related to insurer's financial quality. Corporate insurance buyers tend to choose insurers that are highly rated. This is due to the nature and complexity of the business risk, which requires very detailed and specific insurance covers. On the other extreme, personal insurance buyers who seek personal insurance covers such as motor insurance and homeowner insurance require less sophisticated policies. In this case, prices and demand are less sensitive to an insurer's financial strength (Doherty et al 2012).

3.2 REVIEW ON FINANCIAL PERFORMANCE OF INSURANCE COMPANIES.

This section serves as the foundation for the study. It will start by looking at general reviews of financial performance of insurance companies. In addition, it will also consider the location of study and types of insurers in the discussion.

Earlier studies related to FP concentrate on analyzing the insolvency risk or predicting insurers' failure (Doumpos et al 2012). Insolvency within the insurance industry has become a major issue of public debate and concern in the late 80s (Brockett et al. 1994), and the identification of potentially

troubled firms has become a major regulatory research objective.Previous studies on the topic of insurer insolvency prediction include Pinches and Trieschmann (1974), Harrington and Nelson (1986), Ambrose and Seward (1988), BarNiv and Hershbarger (1990), BarNiv and McDonald (1992), Baranoff (1993), Pottier (1998) and Pottier and Sommer (1999). BarNiv and McDonald provide a particularly good review of the previous research techniques, and the research was consulted for further information on alternative approaches.

However, the US-focused theme, which revolves around insolvency, is regarded as rigid and very country-specific (Kramer 1996 and Sharpe and Stadnik 2007). For other insurance industries, especially the newly developed industries with a highly regulated structure and no insurer failures; insolvency issue is almost non-existent. In this case, they are more concerned on assessing the strength and stability of the insurers operating in the industry (Kramer 1996 and Ceccarelli 2003). In addition, scholars are trying to evaluate insurer performance in order to detect distress among the companies that will allow the regulators to take corrective actions (Sharpe and Stadnik 2007).

Moving away from the insolvency issue, most recent studies evaluate financial performance from various aspects. Interestingly, Berger and Humphrey (1997) contend that due to the intangible nature of insurance products, the determinants of financial performance become a difficult concept. In this vein, Burca and Batrinca (2014) claim that relevant studies on the financial performance of insurance companies are limited, if compared to reviews on banks performance.

Adams and Buckle (2003) evaluate insurers' financial performance in an offshore financial centre, namely the Bermudian insurance market. Their analysis consists of 47 insurers with data from 1993 to 1997. Their study is restricted to company characteristics as independent variables. Results from the panel data analysis show that insurers with high leverage, low liquidity and reinsurance companies have better financial performance than

those at the opposite side. They also highlight that there is a positive relationship between underwriting risk and performance, while size and business activities are not relevant to performance.

However, their conclusion on variable “size’ contradicts many other previous findings. Elsewhere, company size has been found to be positively correlated to financial performance. Browne et al (2001) provide empirical evidence that company size is positively related to the financial performance of US life insurers. The same conclusion has been presented in early studies; emphasizing that there is a positive relationship between financial performance and company size (Grace and Timme 1992). The debate behind this shows that larger insurance companies normally have greater capacity for handling adverse market fluctuations relative to smaller insurers, have better economics of scale and they are also financially-able to obtain managerial professionals.

Shiu (2004) examines the financial performance of UK general insurers over the period of 1986 -1999. She uses three key indicators in her study which are investment yield, percentage change in shareholders’ funds and return on shareholders’ fund. This empirical study tested 12 explanatory variables and discovered that the financial performance of UK general insurers is positively correlated with interest rate, return on equity, solvency margin and liquidity. In addition, performance is negatively correlated with inflation and reinsurance dependence. She also conducted another study that focuses on UK life insurers, by using both firm-specific and economic variables (Shiu 2005). She derives a conclusion that life insurers’ financial performance is positively related to bonds-to-total assets, equities-to-total assets and the level of new business.

On a different basis, Curak et al (2011) study the determinants of financial performance of the Croatian insurers. This study focuses specifically on composite insurers. These are insurance companies that are licensed to transact both life and general insurance products. They establish that

company size, underwriting risk, inflation and return on equity are the determining factors in insurers' performance.

The European insurance markets are evolving rapidly nowadays. Earlier studies attempted to evaluate the financial strength of general insurers in a Dutch market (Kramer 1996) and general insurers in an Italian market (Ceccarelli 2003). There are several recent studies conducted on other European insurers that provide valuable insight into the discussion (Kozak 2011 and Burca and Batrinca 2014). Kozak (2011) examines the profitability of 25 general insurance companies in Poland during 2002-2009. The main finding derived from this study shows that the profitability and efficiency of insurers are negatively correlated with types of insurance product offered. Hence, it could be concluded that offering various types of insurance policy entails higher cost which will affect the profitability of an insurer.

Subsequently, Burca and Batrinca (2014) evaluate the financial performance of the Romanian insurance market between the period of 2008 and 2012. They study 41 insurers and have employed panel data regressions using 13 variables. They discover that company size, loss ratio, financial leverage, growth, underwriting risk, risk retention ratio and solvency margin are key determinants that affect the financial performance of Romanian insurers.

Similar findings are derived from the Ethiopian insurance sector (Mehari and Aemiro 2013). They use a sample of nine Ethiopian insurers over the period of 2005 – 2010 to investigate the impact of firm-specific factors on insurers' performance. They conclude that the size, loss ratio (risk), tangibility and leverage are key determinants of insurer performance. On the other extreme, growth, insurer's age and liquidity are statistically insignificant determinants.

There have been extensive studies concerning insurer's financial performance in the Asian insurance market. Connelly and Limpaphayom (2004) examine the influence of board characteristics of Thailand life insurers on performance. They discover that board composition is positively

related to profitability but negatively related to underwriting risk. They also indicate that board size is not a relevant determinant of performance. Chen and Wong (2004) conduct a comparative analysis to compare the financial health of insurers in Japan, Korea, Singapore and Malaysia. These are well-established insurance industries among the developing countries. On a different note, Charumathi (2012) investigates the performance of life insurers in the Indian market. The Indian insurance market is the least profitable market among all Asian countries since it is suffering from fall in new business premium during 2010-2011. His sample includes 23 Indian life insurers over the period of 2008 – 2011. He finds that leverage and premium growth have negatively influenced the profitability of Indian life insurers.

Ahmed et al (2011) and Malik (2011) both investigate the financial performance of Pakistani insurance companies. Their samples differ slightly, whereby Ahmed et al (2011) focus on five life insurers while Malik (2011) includes all insurers (34 insurers) in his analysis. Their findings are almost similar – financial performance of Pakistani insurers is influenced by size, risk and leverage. In addition, Malik (2011) contributes to the literature by defining the variables' association; performance is positively correlated to size and negatively correlated to leverage and risk. However, it could be assumed that both studies have an obvious limitation, in terms of the number of insurers included in the sample which provide a small sample size.

The study takes a different approach when applied to a Malaysian landscape. The Malaysian insurance industry is sub-divided into two main categories, which are the conventional insurance and the Islamic insurance. The conventional insurance is similar to all other insurances while the Islamic insurance is a sharia'-compliant mutual risk arrangement on the basis of mutual protection and joint responsibility (Billah 2007). Islamic insurance companies are also known as Takaful operators, in which they have to ensure that their operational activities are Sharia' compliant.

Subsequently, Yakob et al (2012) and Ismail (2013) examine the financial performance of Takaful operators and insurers in Malaysia. Yakob et al (2012) use the CAMEL rating approach in her analysis which follows a study conducted by Hsiao and Whang (2009) on Taiwanese insurers. On the other hand, Ismail (2013) uses panel data over the period of 2004 to 2007 in his observation. He observes that size, reinsurance dependence and solvency margin are key factors that affect the financial performance for both conventional insurers and Takaful operators. Interestingly, there is no significant difference between the types of insurers, most probably due to similar operational functions and similar regulatory supervision under one regulatory body.

3.3 SOME APPROACHES TO EVALUATE FINANCIAL PERFORMANCE

In this section, the discussion will focus on approaches/models that have been used in the previous study that relate to our primary objectives. The aim is to investigate the financial performance of insurers on the basis of its rating performance. Thus, some approaches that have been used to evaluate the rating performance of insurers will be discussed. This section will be sub-divided appropriately.

3.3.1 Markov Model

Lando and Skodeberg (2002) apply the Markov chain model to estimate transition matrices. They utilize the continuous-time method and demonstrate the estimation of transition intensities for the Markov chain. They also compute the discrete-time method (cohort method) transition matrix. Following their study, Berd (2005) employs the continuous-time Markov model to describe the rating transition process. He argues that the discrete (cohort) method is inconsistent with the Markovian assumption for rating transitions, which reflects a non-Markov behavior of ratings. However, the cohort method has been extensively used in many studies (Frydman and Schuermann 2008, Hadad et al 2009 and Wang 2010). In addition, the cohort method also becomes the primary estimation used by many rating

agencies such as Moody's and Standard and Poor (Carty 1997 and Carty and Fons 1997).

The work of Frydman and Schuermann (2008) assumes that the rating process is time-homogeneous Markov. Thus, the prediction of credit rating transitions could be based on past credit quality changes of the firm. They propose a parsimonious model that combines two Markov chains, focusing on the speed of movement among credit ratings. They also study the non-Markov behavior of their data that implies that the future distribution of a firm's rating does not only rely on its current rating, but also on its past rating history.

Hadad et al (2009) examine the rating migration matrices of financial corporations and bond performance in Indonesia. They utilize both the cohort method and the continuous method in their study. In addition, they supplement their analysis by looking into the non-Markovian approach. In this instance, they examine the rating quality in terms of its rating activity and rating drift of their sample. The cohort method resulted in transition matrices with uneven probability distribution along its diagonal area and it failed to depict the relationship between rating stability and rating grades.

Alternatively, the continuous method has presented a consistent outlook and it successfully reflects the relationship between rating stability and rating grades. Both methods demonstrate that the creditworthiness of financial companies and bond performance improve over time. It is also evident from the rating activity and rating drift analysis.

Insurance ratings are not renewed as frequently as bond ratings. Thus, this limitation is acknowledged in Wang (2010) as a restriction to apply the continuous method. With the absence of continuous data, this study reverts to the cohort method, which is extensively used by rating agencies to estimate the probabilities of insurer's rating

transition. They also incorporate the difference of economic and industry cycles in their analysis. They provide a body of evidence that the distribution of insurer's rating changes is influenced by economic and industry cycles and those insurers in favour of the economic and industry cycles reflect better overall performance.

A study by Malik and Thomas (2012) applies the Markov model to examine the rating transitions of consumer loans. Their Markov chain model is constructed based on the behavioral scores that influence the credit risk portfolio of consumer loans. Sample is derived from credit card customers of a major UK bank, over the period of 2001 – 2005. This paper contributes a pilot scheme to employ the Markov chain on behavioral scores to predict the risk of consumer loans.

There is an alternative body of literature that demonstrates the importance of non-Markovian behaviors in rating dynamics. An example of a Non-Markovian behavior describes the influence of the current rating downgrade on the next rating downgrade, rather than an upgrade (Dang and Partington 2005). Subsequently, Lando and Skodeberg (2002) establish an adverse association between transition probabilities and the length of time to remain in a particular rating grade.

Hamilton and Cantor (2004) argue that the direction of prior rating change tends to influence transition probability. In addition, Figlewski et al (2006) show that the rating momentum does exist and they include the ageing factor in their evaluation. They establish that the longer the length of time since the firm is first rated, the higher possibility that the firm will default.

A recent study by Wang and Carson (2014) examines the non-Markov effects for general insurers' rating transitions. They analyse three different rating drift phenomena by using the Cox proportional hazard model and Best rating for the period between 1995 and 2006.

Compared to bond ratings, there is still lack of studies of insurance rating transitions. Nevertheless, insurance ratings are imperative in the academic literature and to various stakeholders in the insurance business. They declare that the study is the first one to investigate the non-Markovian behavior as reflected in the rating drifts. They contributed to the body of literature by providing two findings. Firstly, insurers with secure rating grades have higher probabilities to remain in their current rating grades. Secondly, rating changes are positively correlated with future rating performance.

3.3.2 Rating Transition Matrices (RTM)

Rating transition matrices (RTM) are also known as credit transition or credit migration matrices. According to McNulty and Levin (2000), these matrices are a convenient approach depicting past changes in the credit quality of obligors (obligors are firms or entities under evaluation). Their inputs are vital to many risk management applications including risk assessment and credit term structure modeling (Jafry And Schuermann 2004 and Frydmann and Schuermann 2008). Some of the earlier applications of the RTM can be found in bond pricing models introduced by Jarrow and Turnbull (1995), credit derivative pricing models like in Kijima and Komoribayashi (1998) and Acharya et. al (2002) and also CreditMetrics simulation for credit portfolio models developed by Gupton et al (1997). The application of these matrices can also be beneficial in analysing flow in the population, measuring policy impact or forecasting future changes.

Transition matrices are widely used to explain the dynamics of changes in an event,e.g., credit quality of a company. In fact, these matrices are also one of the key elements imposed by the New Basel Accord capital requirements (BIS 2001). These methods are becoming more well-known in the financial industry where historical transition matrices are published on an annual basis by many rating

agencies worldwide (Israel et. al. 2001 and Lando and SkØdeberg 2002).

There are two generally-accepted methods of estimating transition matrices, the cohort method and the duration method (Jarrow, Lando and Turnbull 1997, Lando and SkØdeberg 2002, Mählmann 2006, Frydmann and Schuermann 2008 and Hadad et. al 2009). The cohort method is also known as the discrete method or the time-homogeneous method as used by Jarrow, Lando and Turnbull (1997). For ease of estimation, this method assumes that the probability of changing from one rating to another is constant over time (homogeneous). This method also assumes that future rating changes are not affected by the rating history, which is referred as the ergodicity of the Markov chain (a Markov property).

The other method, which is known as the duration or the continuous time method relies on the assumption that rating agencies have access to continuous-time data on rating transitions and they know the exact dates within a year that a company changes its rating or is downgraded. This method has been applied in many researches (Bangia et. al 2002; Lando and SkØdeberg 2002 and Krüger et. al. 2005) and is based on modern survival analytic techniques which have several advantages over the cohort method (Jafry and Schuermann 2004). The objective of the duration method is to estimate a generator matrix, i.e. its matrix algorithm, which will be used to tabulate the transition matrices over any time horizon (Frydman and Schuermann 2008 and Engelmann and Ermakov 2011).

RTM reflects the credit quality of a company by looking at the rating changes. The quality in question is either improving or deteriorating, reflected by the upgrading and downgrading of letter rating obtained by the company (Hadad et al, 2009). RTM is also used to explain the migration of creditor quality as measured by proxies such as bond

ratings (Jones, 2005). According to the same fundamental, this research uses the RTM to explain the migration effect of insurers' quality, with the proxies being insurers' financial strength ratings (FSR).

3.3.3 Reviews on financial strength rating performance analysis

Earlier studies focus on debt rating determinants by measuring profitability, liquidity, capitalisation, interest coverage, debt status and industry indicators (Blume et. al. 1998; Estrella et. al. 1999, Tabakis and Vinci 2002; Altman and Rijken 2004, Amato and Furfine 2004 and Grunert et al 2005). All studies assess large financial corporations and banking institutions and none focuses on insurance companies. In addition, all studies, except those by Tabakis and Vinci (2002) and Grunert et al (2005), concentrate on US financial and banking corporations.

Blume et al (1998) and Amato and Furfine (2004) have a similar approach in their studies. Both investigate the credit rating performance of large financial corporations in the US by employing the ordered probit regression model (OPM). They reach a similar conclusion; credit ratings are influenced by profitability and liquidity. On a different basis, Grunert et al (2005) investigate the influence of internal credit ratings of four major German banks. Their study differs by incorporating non-financial factors, namely management quality and market position in their analysis. They propose that the combination on financial and non-financial factors leads to a more accurate prediction of future defaults events. However, non-financial data are not easily accessible. This might become a limitation in many studies.

Tabakis and Vinci (2002) analyse and compare rating determinants for 67 European banks by using rating information from Standard & Poor (S&P), Moody's and Fitch rating agencies. They establish that rating agencies rely on balance sheet information, profitability,

liquidity, efficiency, capital adequacy and loan intensity ratios to evaluate banks' financial performance.

Insurer ratings are extensively used to evaluate insurers' financial strength and insolvency risk (Wang and Carson 2014). Again, previous studies focused mainly on insurers in the United States (US) (Gaver and Pottier 2005, Eckles and Pottier 2011, Doherty et al 2012, Eckles and Halek 2012 and Kartasheva and Park 2012).

To the best of author's knowledge, the most prominent study that evaluates UK insurers' rating performance is the work conducted by Adams et al (2003). Their study compares insurer rating performance between two rating agencies and the determinants of rating grades assignment. Their sample consists of 40 insurers with A.M Best ratings, 25 insurers with Standard & Poor ratings and 28 non-rated insurers over the period of 1993 to 1997. The dependent variable (DV) is an ordinal variable, which is the propensity to be assigned a particular rating. They employ an ordered probit regression model (OPM) in their analysis which consists of seven explanatory variables (leverage, profitability, liquidity, growth, size, organizational form and reinsurance). Their outcomes show that rating assignments from both agencies are influenced by profitability and liquidity. Subsequently, mutual insurers tend to have higher ratings than stock insurers and leverage is negatively-related to rating grades, i.e insurers with lower financial leverage will have better ratings.

Gaver and Pottier (2005) investigate 80 publicly-traded US general insurers (also known as property-liability insurers) that have the Best FSR for the year end of December 1997. Their focus is to investigate the influence of holding company financial information on the rating determinants. They highlight that capitalization, liquidity, profitability and size are key determinants that affect ratings both at individual firm level and group level. Their study, however, includes an

extremely short period of observation, which is only one year. This is a major drawback that can be addressed in future research.

Economic and finance theories suggest a positive association between firm efficiency and financial strength. Thus, Eckles and Pottier (2010) investigate the relationship between insurer efficiency and insurer financial strength ratings. Their study differs from the others in which they use the Data Envelopment Analysis (DEA) in order to measure efficiency. The DEA is a linear optimization method that could be used to calculate efficiency scores. It also allows for the estimation of the "best practice" efficiency frontier for firms in the sample. DEA has been used in various efficiency studies within the property-liability insurance sector (Cummins and Nini 2002 and Brockett et al 2004). Interestingly, they manage to provide evidence that conforms to the theory. However, as the stand-alone criteria, firm efficiency is a weak predictor of financial strength ratings. Thus, firm efficiency itself is deemed as an insufficient determinant and should be used in conjunction with other firm-specific characteristics.

In another study, Eckles and Halek (2012) examine the determinants of abnormal financial market reactions to insurer rating changes. They analyse the characteristics of rating changes relative to market reactions following rating downgrades. Their sample consists of 109 publicly traded US insurers who receive rating downgrades from various rating agencies over the period of 1993-2003. A general conclusion derived from their study indicates that the market reacts differently to the basic rating downgrades issued by different rating agencies.

Kartasheva and Park (2012) investigate the impact of rating changes on firms' credit quality. This is another US-based study to demonstrate the real effects of new rating standards on the credit quality of insurers. Interestingly, their sample includes insurers who are exposed to catastrophic risks, specifically hurricane Katrina in

2005. Prior to the hurricane, major rating agencies revised their standards and introduced stringent standards for insurers exposed to catastrophic risks. According to the revised standards, insurers are required to hold larger capital in order to maintain position in the same rating grade. However, this new requirement has affected the credit risk distribution in the industry and reduced insurers' ability to sustain large losses resulted from catastrophic events. This might be due to the requirement imposed by the revised standards, where insurers hold larger capital to maintain their rating grade but at the same time have difficulties in raising capital.

In addition, Florez-Lopez (2007) and Van Gestel et al (2007) examine the ability to develop classification models to forecast insurance ratings. Van Gestel et al (2007) provide a detailed discussion on the appropriate financial variables that could be tested to determine rating changes according to types of insurer. However, there are two major drawbacks linked with these studies. First of all, the samples used in these studies are usually concentrated on large insurance firms that apply financial ratings. Second of all, there are various criticisms against rating agencies such as fallibility, bad faith, timeliness and bias towards market criticism (Golin 2001).

Some of the various challenges faced by rating agencies include the lack of timeliness in making rating changes (Loffler 2005 and Gu et al 2014). In addition, there is no ultimate rating methodology and the rating assessment does not cover the whole spectrum of insurance operations (Goldstein et al 2000 and Cheng and Neamtiu 2009).

3.4 OVERVIEW OF THE GLOBAL FINANCIAL CRISIS

An important part of the analysis is a financial strength comparison between two distinctive periods, namely the pre-financial and post-financial crisis periods. Based on data availability, the time frame for all analyses is a five-year period starting from 2006 to 2010. Thus, a specific breakpoint between these two periods needs to be justified clearly.

Schwartz (1986) defines financial crisis as a state triggered by fears indicating that the payment will be unobtainable. She claims that no financial crisis has occurred in the United States since 1933 and none has occurred in the United Kingdom since 1866. Hence, the recent financial crisis that has affected the world's economy has been a shock and an unforeseen event.

The origin of the financial crisis that hit the financial markets in the United States and across the world was multi-faceted, as it was triggered by asset price bubble and aggravated by others, such as financial innovations that masked risks, companies that failed to follow their own risk management practices and regulators and supervisors who failed to control excessive taking (Baily et. al. 2008). There are many names to the most recent financial crisis that began in 2007. It is a global phenomenon, thus dubbed the Global Financial Crisis. In the UK itself, it is often referred as the Credit Crunch. However, from the economists' perspective; there is no general definition of credit crunch (Clair and Tucker 1993, Nehls and Schmidt 2004 and Gern and Jannsen 2009). The difference lies in the cause of the contraction and whether credit is limited by means other than the price.

The crucial point of the UK financial crisis which started in mid-2007 was the main emphasis on many economists and scholars' discussions (Barrell and Davis 2008, Mizen 2008, Martin and Milas 2009, Busch 2010, Erkens et. al 2010, Vriesendrop and Gramatikov 2010 and Evans 2011). In these papers, the onset of the financial crisis is pinpointed to mid-2007, July 2007 or the summer of 2007. Even though financial crisis phenomena are not an uncommon event, the crisis during this period (2007 to 2010) is the largest and the worst since the Great Depression in 1929 – 1933 (Barrell and Davis 2008 and Trivedi 2010). Busch (2010) claims that the UK was exposed to a severe economic downturn in mid- 2007 and becomes one of the hardest hit countries in the western world with a projected budget deficit of 12.6% in 2008.

Vriesendrop and Gramatikov (2010) conduct a survey to examine the impact of the financial crisis on the global market. Their survey focuses on 435 professional insolvency practitioners across 10 countries, and 74 respondents are from the UK. Of all the UK representatives, 59 of them are practitioners with more than 15 years of experiences in the field of insolvency law and who have been dealing with more than 200 cases of business in financial troubles since 2004. Observations from 2004 to 2007 are pooled into the *before* crisis period and those after 2007 are clustered into the *after* crisis period. Following this trend, it becomes the basis for the comparative breakpoint used in our study.

Within the insurance industry itself, insurers' assets and liabilities or their balance sheets are still affected by the recent financial crisis (Guinn et. al. 2008 and Schich 2009). This is because assets are mostly held in bonds and stocks, which simultaneously face valuation pressure during the crisis (Schich 2009). There are also risks that arise out of investment write-downs and underwriting losses. The degree of impact varies, according to the industrial sector and individual company. However, general insurers will be heavily challenged, with an 8% decline in the first three quarter in 2008 (Guinn et. al. 2008). Mortgage and financial insurers, as well as large reinsurance companies are also exposed to credit and market risks during the crisis. Schich (2009) and Harrington (2009) also discuss the impact of financial crisis on the credit rating performance. The possibilities of a rating downgrade are greater, as illustrated in the US life insurance sector during the fall of 2008. Its rating outlook is modified from stable to negative by at least one of the three major rating agencies. Subsequently, rating agencies in other jurisdictions, including Europe also project a negative outlook since the onset of the financial crisis in mid-2007. Harrington (2009) mentions that several large US insurers had experienced rating downgrade and suffered a certain degree of financial distress. In addition, a few insurers sought and received permission in some jurisdiction to modify their financial reporting in order to improve their reported capital.

In 2008, A.M Best reported that 81% of US property-casualty insurers managed to maintain their current rating grades, 4% experienced rating downgrades, and another 4% were upgraded. Again, the effect of the financial crisis is reflected in the rating movements. The federal financial assistance (TARP) was introduced and granted to qualified insurers such as Hartford Financial (US$3.4 billion) and Lincoln Financial (US$950 million). Schich (2009) mentioned that larger financial guarantee insurers suffer from rating downgrades which impede their business opportunities. A good rating grade is vital to their business models and rating downgrade is a disadvantage in their operations.

The reliability and efficiency of credit ratings in evaluating insurer's financial strength have also been discussed in previous studies. Tower and Impavido (2009) propose that the international solvency standard should be reviewed as there is no commonality in measuring and assessing insurer's financial strength other than its ratings. A similar proposal is raised by Murphy (2008), questioning the lack of regulation which resulted in inadequate disclosures and difficulties in understanding and analysing the credit ratings as compared to bond ratings.

Thus, it could be presumed that the financial crisis does affect insurer's financial strength, and this effect could be reflected in their rating performances. This effect is projected using rating transition matrices by comparing the performance between two periods, namely the pre-financial crisis and post financial crisis. However, it should be noted that the transition matrices only illustrate the changes and not the reason why it happens. Based on the discussion, the selection of breakpoint is justified between a pre-financial crisis period and post-financial crisis period. All data from 2006 to 2007 will be grouped into the pre-financial crisis period and data from 2008 onwards will be grouped into the post-financial crisis period.

3.5 DETERMINANTS OF FINANCIAL STRENGTH RATING (FSR) PERFORMANCE

This section reviews the literature on the possible relationship between financial performance and its determinants. The discussions will serve as the basis to formulate research hypotheses that correspond to the fundamental theory based on the empirical reviews.

The US-based National Association of Insurance Companies (NAIC) introduced a set of standard financial ratios that could be used to evaluate the financial condition of insurance companies and other financial service companies. It focuses on capital adequacy, management operations, earnings and liquidity (also known as the CAMEL criteria). These ratios have been used extensively to evaluate insurer's financial performance (Adams et al 2003, Charumathi 2012, Yakob et al 2013 and Doumpos et al 2013). Browne et al (1999) highlight that regulators and insurance managers have been trying to use various financial indices to evaluate financial performance. This leads to the assumption that there is no universal guidance or specification regarding the most suitable determinants which influence the performance of insurance companies.

Adams et. al (2003) conduct a UK-based study to investigate the financial strength ratings performance by employing the CAMEL criteria as the basis of their rating framework. The firm-specific financial characteristics that they tested in their study are leverage, profitability, liquidity, company size, reinsurance, growth and organisational form. In addition, Mao et al (2014) list down several financial indices that could be appropriately used in measuring insurer's performance. The financial indices are profitability, capitalization, liquidity, reserve adequacy, investment, underwriting capacity and reinsurance. According to Van Gestel et al (2007), all of these variables are appropriate for assessing the performance for all types of insurance companies.

Within the insurance industry itself, financial strength ratings (or insurer ratings) have been traditionally used as measures of insolvency risk and

financial quality (Adiel 1996, Anthony and Petroni 1997, Cummins and Danzon 1997 and Pottier 1998). It could be concluded that there are several dominant financial factors that influence insurer's solvency and bankruptcy. The factors are asset, liability and profitability (Kahane et. al. 1986 and MacMinn and Witt 1997), liquidity (Kahane et al 1986), capitalisation (Kahane et. al. 1986, MacMinn and Witt 1997 and Doherty 1989), size (Cummins and Sommer 1996), growth (Harrington and Danzon 1994), diversification (Sommer 1996) and use of reinsurance (Berger et. al. 1992). However, insurers' financial strength and rating determinants have not been discussed by many (Pottier 1997, Pottier and Sommer 1999, Burton et. al. 2003, Gaver and Pottier 2005 and Florez-Lopez 2007).

Nonetheless, Doumpos et al (2012) argue that there is no theoretical guidance for the selection of specific criteria to measure performance and propose a basis for criteria selections. The variables to be selected should be based on data availability, previous studies on insurance firms and efforts to incorporate various aspects of the financial profile of insurers. This study attempts to investigate the financial performance of insurance companies by using specific variables (determinants) that have been used in other studies. In this study, the evaluation of financial performance is based on its financial strength ratings, and the determinants to be examined depend on data availability and efforts to expand the works of previous studies.

This study employs the CAMEL criteria as the basis of the FSR framework. Each determinant is discussed and its association to the financial performance will also be established. Altogether, eight variables are selected as determinants of the financial strength rating performance and the selection is heavily restricted by the data availability issue. The variables are explained as follows:

3.5.1 Leverage (LEV)

The financing or leverage decision is imperative as this factor influences the shareholder's risk and return and the market value of the firm (Pandey 2007). As in Van Gestel et. al (2007), this variable

measures the capital adequacy of an insurer. It is one of the important criteria for the CAMEL approach. Adams et al (2003) define leverage as a determinant to reflect an insurer's ability to write new business without causing financial stress on its capital. They argue that higher financial leverage will increase the potential for adverse effects of variation in underwriting performance. Eventually, this will impair insurer's ability to fulfill its obligations to policyholders and investors.

Interestingly, several previous studies show contradicting findings of the relationship between leverage and financial performance (Gupta et.al. 2010). Ghosh et. al. (2000) and Berger and di Patti (2006) indicate a positive relationship between leverage and FP while several other studies reported a negative correlation (Gleason et. al. 2000, Simerly and Li 2000 and Zeitun and Tian 2007). However, their measurement of leverage is based on the trade-off theory for the capital structure and which might not be appropriate for evaluating the financial strength rating performance of insurers. A.M Best (2010) claims that insurer that is highly-leveraged might not be able to fulfill its financial obligations during the occurrence of large catastrophic loss event. Burca and Batrinca (2014) demonstrate a negative linkage between financial leverage and insurer's performance.

Thus, based on the empirical evidence, it is hypothesised that insurers with lower leverage will have a higher probability of obtaining a higher rating grade. In this instance, it is assumed that leverage is negatively correlated with the FSR performance.

3.5.2 Profitability (PROFIT)

There are many ways to measure profitability, but its measurement must be in accord with the application. Profitability is a key determinant in evaluating insurer's performance (A.M Best 2010). In finance, profitability could be measured using return on investment capital, return on equity or return on assets (Nguyen 2006). On the

topic of insurance performance, profitability is a measure to evaluate investment efficiency and management ability to control expenses and premium prices. Kashish (1998) show a positive linkage between profitability and insurer performance. In addition, Gaver and Pottier (2005) conclude that a more profitable insurer will have lower insolvency risk and higher FSR. Thus, it is hypothesised that insurers with higher profits will have a higher probability of obtaining a higher rating grade.

3.5.3 Liquidity (LIQUID)

The International Financial Reporting Standards (IFAS, 2006) defines liquidity as the availability of cash in the near future, after fulfilling the financial obligations over a specific period. Almajali et al (2012) establish that liquidity has a significant effect on insurer's financial performance, in which higher liquidity allows a firm to deal with unexpected contingencies and to fulfill its financial obligations (Omondi and Muturi 2013). In an insurance setting, the company with higher liquidity signifies a better claim payment ability and stronger financial condition (Shiu 2004) which will increase their chances at obtaining better rating grade. Thus, it is hypothesised that insurers with higher liquidity will have higher probability of obtaining a higher rating grade. We conclude that liquidity is positively related to FSR performance.

3.5.4 Company size (SIZE)

There is a positive relationship between size and company performance which is due to the operating cost efficiency by increasing outputs and minimizing the unit of cost (Hardwick 1997). Bouzouita and Young (1998) propose that company size tends to be positively correlated with assigned credit ratings since larger companies have the means to obtain managerial expertise, economies of scale, depict better market positions and good public reputation. Subsequently, Hvide and Mòen (2007), Fenn et al (2008), Flamini et al (2009) and Kartasheva and Park (2012) conclude that

larger firms have better performance and they are more competitive than smaller firms. All studies predict a positive linkage between size and financial performance.

This variable is measured as the natural logarithm of the total assets of the insurance companies (Malik 2011, Ismail 2013, Burca and Batrinca 2014). However, Van Gestel et al (2007) introduce an alternative to measuring company size, which is the gross premium written instead of the total asset. They argue that this proxy is more suitable for insurance companies. This alternative has been tested in several recent researches, such as the ones conducted by Ahmed (2011) and Charumathi (2012).

This variable is included in the evaluation with the assumption size and FSR performance being positively correlated. The hypothesis to be tested should be looking at larger insurers which will have higher probability of obtaining a higher rating grade.

3.5.5 Reinsurance (REINS)

Reinsurance is a risk transfer mechanism from the primary insurer to a third party in order to reduce uncertainty related to the frequency and magnitude of future losses. Calandro and Lane (2001) suggest that reinsurance factor should be added to the list of determinants of insurer performance. To date, there is no definite association between reinsurance and rating performance. Thus, it might be meaningful to study the effect of reinsurance on FSR performance.

High reinsurance dependency could signify a negative outlook towards the insurer's overall performance. A possible explanation for this suggestion could be that the extent of the reinsurance usage has a potentially conflicting impact on an insurer's business uncertainty (Gatzlaff 2009 and Cole et al 2011). Pottier and Sommer (1999) establish an adverse association between the amount of reinsurance held and rating grade assigned to insurers. Similar finding is evident

in Sharpe and Stadnik (2007). Hence, higher dependency on reinsurance is not a favourable practice in maintaining good FSR performance.

On the other hand, higher reinsurance dependency could influence better rating grades since greater burden of risk has been shifted to the reinsurer. From a rating agency perspective, reinsurance gives a positive impact to ratings performance in several ways. First, reinsurance influence better rating grades if it is used to obtain flexibility to underwrite additional businesses. Second, it is also useful in order to obtain reinsurer's expertise and access to new business ventures (Ehrlich et al 2010). Third, reinsurance can be utilised to allow a parent company to assume all adverse risk from its subsidiaries. In this instance, unfavorable risk from the subsidiaries will be transferred to its parent and favorable risks will be retained. Retaining good risks provide positive outlooks for the subsidiaries (Kuschel et al 2011). Fourth, reinsurance can be used as a means to exit a business. This often has a very positive rating implication since insurers will only make an exit from unprofitable businesses. Retaining all the profitable businesses helps to boost rating grades and performance (Wallace et al 1993).

Since the positive impacts outweigh the negative impacts, it is concluded that insurers holding higher amount of reinsurance will have a higher probability of obtaining a higher rating grade.

3.5.6 Growth (GROWTH)

The impact of growth on firm's uncertainty and potential ratings is ambiguous (Cole et al 2011). They claim that strong growth position may signify that policyholders are confident with the financial strength of the insurer, thus reducing uncertainty. In earlier studies, Adams et al (2003) suggest that positive growth in the annual surplus could signal a favourable financial position, which could lead to stronger future cash flow performance and higher economic value. Epermanis

and Harrington (2006) and Eling and Schmidt (2008) state that rating upgrades for low-rated insurers help to generate increases in growth which will help to increase the overall performance.

However, a higher growth rate could trigger financial strain, especially for life insurers since a growing business involved “new business strain’. Brennan et al (2013) claim that rapid growth is one of the key factor that trigger financial distress and failure among insurers. They study cases and the cause of insurers’ failures and they found that Taisei Fire Insurance (Japan), Independent Insurance (UK) and AIG (UK) suffered financial distress and failed due to rapid growth and incorrect expansion strategy.

In this study, it is hypothesised that insurers with greater growth in the annual surplus will have a higher probability of obtaining a higher rating grade.

3.5.7 Business Type (TYPE)

Prior literature has highlighted that different insurance business types are associated with systematically different levels of risk, focusing on the business written and investments (Downs and Sommer 1999, Cole et al 2009). This variable is included as a qualitative variable and will be measured as a proxy to capture the differences in business type. The data consist of all insurers; life insurers, general insurers and composite insurers. Thus, a dummy variable will be created to represent each and every type of insurers.

Traditionally, life insurers’ operations had been more predictable than the others. Their operations were realised through the application of actuarial principles in policy valuation and solvency requirement. Life insurers also operate based on long-term capacity, providing them a more stable platform and less exposure to unanticipated losses. On the other hand, the general insurer is more susceptible to unanticipated losses caused by fluctuating annual premiums,

reducing operating costs and revising underwriting terms at short notice. Again, this is due to the nature of the general insurance business, which is a short-term contract.

Adams et. al. (2003) claims that there is no clear prediction about the impact of business type towards financial performance. However, based on the nature of each business, general and composite insurers tend to seek for ratings. A possible justification is that obtaining good rating grades will help to boost company's reputation, reduce the cost of capital and signal better financial performance (Kartasheva and Park 2012). Thus, this study proposes that general and composite insurers are more likely to be assigned a higher rating grade than life insurers.

3.5.8 Organisational form (FORM)

This is another qualitative, proxy variable to be included in the model. Van Gestel et al (2007) ascertain that this variable could be used to evaluate all types of insurance companies and its organizational forms. This variable captures the difference in risk perception between a stock-listed company and mutual insurer.

In an earlier study, Pottier and Sommer (1997) indicate that mutual insurers obtain higher rating grades that stock insurers. Conversely, Kartasheva and Park (2012) highlight that stock insurers are positively related to firm's rating. This is due to their ability to access a wider pool of investors and thus, it needs to pay a lower cost of external financing. Following Kartasheva and Park (2012), it is hypothesised that stock insurers are more likely to be assigned higher rating grades than mutual insurers.

3.6 JUSTIFICATION OF THE PROPOSED RESEARCH AND SUMMARY OF THE LITERATURE REVIEW.

Based on these discussions, it could be concluded that insurers' financial performance is an important research theme in finance. To date, it is admitted that there is still a lack of study done beyond the US continents. In addition, the US-based study on this subject matter is deemed rigid and very country-specific and does not allow for a replication in a very different industry. These US-based studies have focused on insolvency and failures among insurers, common in the US market, thus narrowing the scope of the study. The US insurance market is also a very established market, with the largest percentage shares of the world market. Thus, a direct-country comparison is unjustifiable. Initial studies focus on large insurance industries such as those in the US and UK. However, recent studies have started to explore the theme in various settings and geographical landscapes. This is indeed important contributions to the existing literature of insurers' performance.

According to the Association of British Insurers (ABI 2013), the UK is the largest insurance industry in Europe and the third largest in the world, after the US and Japan. However, it is evident that there is still a lack of study about FP in the UK. Why does this happen? This issue needs to be acknowledged by scholars and reasons for the lack of study need to be established.

Based on previous studies, it is evident that studies are more concentrated on the industry as a whole rather than focusing on the different types of insurer. It is known that the nature of life and general business differs in terms of its risk, operations and obligations. Thus, one should question the importance of the differences between life and general insurers, whether the differences give a significant impact in evaluating financial performance. By acknowledging the difference, one should be able to perform a very meticulous and precise study on the focus group. On the other hand, there is a wider scope of study that has not been fully explored, which is related to

the approaches and methods that could be employed to identify insurers experiencing financial problems at its earliest stage. Accordingly, this study attempts to help identify those with financial problems at early stage that is before they become insolvent.

Based on the literature, rating performance is a significant factor that affects the financial performance of the insurance companies. Thus, this study will investigate the possibility of rating changes. This study is then extended to investigate the significant determinants that affect the rating performance. It is assumed that rating changes are attributable to several firm-specific factors that will be tested in the study. In addition, the effect of the recent financial crisis on insurance performance, as reflected in the rating movements will also be studied.

This study attempts to extend the previous approach of Adams et al (2003) and Gaver and Pottier (2005). It follows a similar approach used by Adams et al (2003) but it aims to be different by including more explanatory variables in the model, and the model in this study defines the dependent variable using a 6-point scale. This study also extends its observation, as compared to Gaver and Pottier (2005) to encompass a period between 2006 and 2009 in the regression analysis. To the best of author's knowledge, financial strength rating studies among the UK insurers have not been the subject of many researches, relative to US insurers. Thus, this study seeks to contribute to the body of literature by examining the financial strength rating determinants of UK insurers.

CHAPTER 4

RESEARCH DESIGN, METHODOLOGY AND THEORETICAL FRAMEWORK

This chapter explains the research design employed in the study. This study utilises secondary data that have been derived and based on one particular database, which is the A.M Best Insurance Report Online – Non-US Database (AMB). The fundamental property of the database is explained thoroughly in this section. This chapter will also provide clarification about the sample selection for the analyses and the justification for the financial crisis breakpoint adopted in this study.

4.1 DATA SETS USED IN THE STUDY

This study utilises two sets of secondary data. The first data set is the rating data which are published by accredited rating agency. The second data set refers to the insurers' financial data. These data are obtained from the financial reports of insurance companies that are included in the rating agency's database. This study chooses A.M Best Insurance Report Online: Non-US Database (Best). The database provides both ratings and financial data, which fulfil the data collection requirement in this study.

4.1.1 Justification on the Selected Credit Rating Agency and Database

There are many external credit rating agencies in the market such as A.M Best (Best), Standard & Poor, Moody's and Fitch. Each rating agency has their sets of standards and methodologies in the rating analysis. However, Trueck and Rachev (2009) state that these variations are tolerable and acceptable, even by the regulatory bodies. Table 4.1.1.1 summarises the similarities/differences of the factors considered in the rating assessment between three external credit rating agencies. In this instance, the focus of assessment is mainly on insurance companies.

Table 4.1.1.1

Financial Strength Rating Determinants Used in Rating Agencies' Assessments

A.M. Best (Best)	Standard & Poor's (S&P)	Moody's
• Business profile • Management and strategy • Operating performance • Investment portfolio and capitalization • Comprehensive quantitative/qualitative assessment regarding company's balance sheet strength • Non-insurance risks • Loss-reserve • Reinsurance activities • Business plan • Regulatory filings.	• Industry risk • Management and corporate strategy • Business reviews • Underwriting results • Investment policy and results • Interest rate risk management • Capitalization • Liquidity • Capital and capital requirements.	• Competitive situation • Regulatory trends • Adequacy of equity capital • Investment risk • Profitability • Liquidity • Products and distribution channels • Quality of management and organization • Others

Source: Author's compilation with reference to Chorafas (2004) and A.M Best Credit Methodology (2010).

From the information in Table 4.1.1.1, it is assumed that there are common similarities among these rating agencies such as Best and Moody's consideration of the regulatory aspect in their evaluation. In addition, capital and financial performances are the main criteria for their assessments. Best performs comprehensive assessments on the balance sheet strength, S&P looks at underwriting, investment and liquidity while Moody focuses on investment, profitability and liquidity.

In this study, the selection of a rating agency is influenced by factors such as financial constraint, data availability, accessibility and research requirements. Rating agencies database is costly and the access to the database needs to be purchased, which is on a yearly basis. In addition, there are several packages to be chosen that give

different data accessibility to users. All these options involve a significant cost that is beyond researcher's financial capacity. The data analysis for this study requires both rating and financial data of UK insurers. These data are available in the A.M Best Insurance Report Online – Non- US Database that can be purchased on a student's concession basis.

After weighing all available options against its cost, the A.M Best rating agency is selected for this study. The decision to select the A.M Best database is also influenced by credentials as the oldest rating agency of insurance companies and its ability to offer the most comprehensive insurance rating coverage (Bouzouita and Young 1998, Wang 2010, Eckles and Pottier 2011 and Kartasheva and Park 2012). One-year access to the database was purchased in 2011. The database provides rating data from 2003 to 2010 and financial data from 2006 to 2010.

4.1.2 The Basic Properties of the Data

Rating Data: A.M Best Financial Strength Ratings (FSR)

A common practice in all rating agencies is to provide two different sorts of ratings that are the issue-specific credit ratings and issuer credit ratings (Trueck and Rachev 2009). Issue-specific credit ratings are assessments of the creditworthiness of an obligor (the entity or firm being assessed) about a particular financial obligation, a specific class of financial obligations or a specific financial program. On the other hand, issuer credit rating focuses on the obligor's overall capacity to meet its financial commitments – or its fundamental creditworthiness. This basic principle serves as the fundamental guidelines used by Best in setting their rating standards.

Within Best's insurance segment itself, there are many types of credit ratings assigned. These include the financial strength rating (FSR), long-term issuer credit rating, short-term issuer credit rating, long-term

debt rating and short-term debt rating. Basically, the FSR relates to issue-specific credit ratings and the others are linked to issuer credit ratings. Best's FSR is the summary measures of insurers' financial strength. It reflects the overall insolvency risk measures and provides rating agency's opinion of the insurer's overall financial strength and ability to fulfil its policyholder obligations (Wang 2010 and Eckles and Pottier 2011).

In this study, the analysis focuses on Best's Financial Strength Ratings (FSR) which is exclusively assigned to insurance companies. Best's FSR provides an independent opinion based on comprehensive qualitative and quantitative evaluations of insurers' balance sheet strength, operating performance and business structure (A.M Best 2010). These ratings are assigned on company basis and not on specific policies, contracts or risks basis. It is assigned based on third party's audited financial data and any other relevant information pertaining to it. The primary source of this information is acquired through company's annual and quarterly (if available) financial statements. In addition, valuable inputs are also attained from meetings with senior personnel and company management. However, its reliability and accuracy are not verifiable by the agency.

Rating Grades: Symbols and Explanations

The FSR is an independent opinion of an insurer's financial strength and their ability to fulfil its ongoing insurance policy and contract obligations. On the other hand, Issuer Credit Ratings (ICR) and Debt Credit Ratings (DCR) are projected on corporate securities and any other insurance-related securitisations. ICR refers to the assessment on an issuer/entity's ability to meet its ongoing senior financial obligations while DCR evaluates the issuer/entity's ability to fulfil ongoing financial obligations to security holders upon maturity. ICR is applicable to all publicly-traded holding companies including all rated

insurance companies. However, FSR is exclusively targeted on the financial strength of insurance companies.

Based on this specification, the analysis in this study opted for the Best FSR which serves as an indicator of insurers' financial strength and ability. FSR scales include 16 individual rating grades which are grouped into ten categories. These categories are further clustered into two distinctive pools categorised as secure and vulnerable. The grades and categories are illustrated in Table 4.1.. The most superior rating grade is denoted as "A++" which is assigned to insurers with superior financial performance. On the other extreme, rating grade "D" is assigned to insurers with poor financial performance and susceptible to adverse changes and economic conditions. Rating grades "E", "F" and "S" reflect problems and issues related to financial performance which include regulatory intervention, liquidation and suspension.

In addition, Table 4.1.2.2 depicts other relevant rating categories, modifiers and outlooks used by Best in assessing insurer's financial strength. These additional designations are introduced to provide more information about a rated entity or security. The Not Rated (NR) categories are assigned to companies with conditions that could impede the rating analysis process. Some of the issues that make these companies disqualified for a Best Credit Rating are attributed to their limited financial information, small level of surplus, lack of sufficient operating experience or due to their dormant or run-off status. As it is difficult for Best to develop an opinion on the company's balance sheet and operating performance, these companies will be assigned a NR-status appropriated to their causes (e.g. NR-1 for companies with insufficient data).

On the other extreme, Best designed specific rating categories applicable to short-term rating exercise. The evaluation will be based on the entity's or security's financial ability to fulfill its short-term

obligations. The categories ranged from “strongest” to “in default”, which reflect the current financial condition of an entity.

Table 4.1.2.1
Rating Grades and Categories Used in A. M. Best Financial Strength Ratings.

A. M. Best Financial Strength Ratings: Scales			
Position	***Descriptor***	***Definition***	***Grade(s)/Symbol***
Secure	Superior	Assigned to companies that have superior ability to meet their on-going insurance obligations	**A++ and A+**
	Excellent	Assigned to companies with excellent ability to meet their on-going insurance obligations	**A and A-**
	Good	Assigned to companies with good ability to meet their on-going insurance obligations	**B++ and B+**
Vulnerable	Fair	Fair ability to meet ongoing insurance obligations. Financial strength is vulnerable to adverse changes in underwriting and economic conditions	**B and B-**
	Marginal	Marginal ability to meet ongoing insurance obligations and vulnerable to adverse changes in underwriting and economic conditions	**C++ and C+**
	Weak	Weak ability to meet ongoing insurance obligations and very vulnerable to adverse changes in underwriting and economic conditions	**C and C-**
	Poor	Poor ability to meet ongoing insurance obligations and extremely vulnerable to adverse changes in underwriting and economic conditions	**D**
	Under Regulatory Supervision	Assigned to companies (and subsidiaries/affiliates) placed under a significant form of regulatory supervision, control or restraint – including cease and desist orders conservatorship or rehabilitation, but not liquidation – that prevents the conduct of normal , ongoing insurance operations	**E**
	In Liquidation	Assigned to companies placed in liquidation by a court of law or by a forced liquidation.	**F**
	Suspended	Assigned to rated companies when sudden and significant events affect their balance sheet strength or operating performance and rating implications cannot be evaluated due to a lack of timely or adequate information.	**S**

Source: A. M. Best 2010.

Table 4.1.2.2

Rating Categories, Rating Modifiers and Rating Outlooks Used by A.M Best

A. M.Best Financial Strength Ratings: Scales		
Position	***Descriptor/Explanation***	***Grade(s)/Symbol***
	Not Rated (NR) Categories	
	Insufficient data	**NR-1**
	Insufficient size and/or operating experience	**NR-2**
	Rating procedure inapplicable	**NR-3**
	Company request	**NR-4**
	Not formally followed	**NR-5**
	Short-term Ratings	
Strongest	Assigned to entity with the strongest ability to repay short-term obligations	**AMB-1+**
Outstanding	Assigned to entity with an outstanding ability to repay short-term obligations	**AMB-1**
Satisfactory	Assigned to entity with a satisfactory ability to repay short-term obligations	**AMB-2**
Adequate	Assigned to entity with an adequate ability to repay short-term obligations	**AMB-3**
Speculative	Assigned to entity with speculative credit characteristics and is vulnerable to adverse economic or other external changes which could affect its ability to meet financial commitments	**AMB-4**
In Default	Assigned to entity with default on payment or when a bankruptcy petition or similar action has been filed.	**D**
	Rating Modifiers	
Positive	Indicates a reasonable likelihood of a rating upgrade	
Negative	Indicates a reasonable likelihood of a rating downgrade	
Developing	Indicates an uncertainty to the final rating outcome, but a reasonable likelihood of a rating change	
Under Review	Indicates that rating may change in the near term, typically within six months	**"u"**
Public Data	Indicates rating assigned to a company that chose not to participate in A.M Best 's interactive rating process	**"pd"**
Syndicate	Indicates rating assigned to a Lloyd's syndicate	**"s"**
	Rating Outlooks	
Positive	Favourable financial/market trends, good possibility of a rating upgrade	**+**
Negative	Unfavourable financial/market trends, good possibility of a rating downgrade	-
Stable	Stable financial/market trends, low possibility of a rating change	**Stable**

Source: A. M. Best 2010.

In Table 4.1.2.2, Rating Modifiers are used as financial strength indicators in a shorter duration, typically for rating assessments within six months. Under the Rating Modifier, a company can be assigned a status similar to the outlook; positive, negative or developing status. Positive and negative implications are associated with rating upgrades and downgrades while developing status indicates the uncertainty to the final rating outcome but with a definite likelihood of change. In addition, any abrupt change or potential immediate change is signposted using “Under Review Modifier”, denoted as “u”. This modifier is assigned after a review has been done in order to determine the impact of company’s rating.

Rating Outlooks are used as indicators of the potential future direction of the ratings. It could be projected as positive, negative or stable outlook. These outlooks are designed to project ratings over an intermediate period between the next 12 to 36 months. Positive outlook is associated with a rating upgrade and negative outlook indicates the opposite. A stable outlook is assigned to companies that have stable financial and market trends, with a low probability of rating change in the near future.

On the other hand, similar grades, scales and rating evaluations are also being used by other credit rating agencies. **Error! Reference ource not found.**.1.2.3 illustrates the rating grades, outlooks and modifiers used by S&P, Moody’s and Fitch. From the table, it could be assumed that all rating agencies have a distinctive similar approach in assessing the financial strength on insurance companies. All agencies have exclusive rating grades to cater to insurers and this also includes specific rating modifiers and rating outlooks.

Table 4.1.2.3: Rating Grades Used by Other Rating Agencies

S&P IFSR		Moody's IFSR		Fitch IFS	
Grade	***Definition***	***Grade***	***Definition***	***Grade***	***Definition***
AAA	Extremely strong financial security characteristics	**Aaa**	Exceptional financial security	**AAA**	Exceptionally stunning financial strength
AA	Very strong	**Aa**	Excellent	**AA**	Very strong
A	Strong	**A**	Good	**A**	Strong
BBB	Good	**Baa**	Adequate	**BBB**	Good
BB	Marginal	**Ba**	Questionable	**BB**	Moderately weak
B	Weak	**B**	Poor	**B**	Weak
CCC	Very weak	**Caa**	Very poor	**CCC**	Very weak
CC	Extremely weak	**Ca**	Extremely poor/in default	**CC**	Extremely weak
R	Under regulatory supervision	**C**	Extremely poor prospects of financial security	**C**	Distressed
NR	Not rated				
S&P IFSR – Short Term		**Moody's IFSR – Short Term**		**Fitch IFS – Short Term**	
A-1	Strong ability to meet it financial commitments on short term policy obligations.	**P-1**	Superior ability to fulfill short term claims and obligations	**F1**	Strong capacity to fulfill shore term obligations
A-2	Good ability	**P-2**	Strong ability	**F2**	Good capacity
A-3	Adequate ability	**P-3**	Acceptable ability	**F3**	Adequate capacity
B	Vulnerable with ongoing uncertainties	**NP**	Not Prime. Does not fall within any of the prime rating categories	**F4**	Weak capacity
C	Currently vulnerable to nonpayment			**C**	Very weak capacity
R	Under regulatory supervision				
Rating Modifiers		**Rating Modifiers**		**Rating Modifiers**	
+	Positive or negative symbol is attached to a rating to indicate the relative position of a credit within the rating category (only applicable to rating grades AA to CCC)	**1**	Obligations rank in the higher end of generic rating category	**+**	Positive or negative symbol is attached to a rating to indicate the relative position of a credit within the rating category (not applicable to AAA-rated or below B-rated)
-		**2**	Mid-range ranking	**-**	
		3	Lower- range ranking		
Rating Outlooks		**Rating Outlooks**		**Rating Outlooks**	
+	A rating may be raised			**+**	A possible upgrade
-	A rating may be lowered			**-**	A possible downgrade
Stable	A rating is not likely to change			**Evolving**	A possible upgrade/downgrade
Dev.	Developing. A rating may be raised or lowered			**Stable**	Rating is likely to remain at current grade
N.M	Not meaningful				

Source: Author's compilation based on S&P 2010, Moody's 2010 and Fitch 2010

Based on information provided in Table 4.1.2.1, Table 4.1.2.2 and Table 4.1.2.3, it could be justified that Best's FSR provides the most rating grade variations relative to the other rating agencies. There are 16 rating grades under Best while the other agencies provide up to 10 rating grades only. Best's FSR also has the added advantage by providing additional five options for the "Not Rated" (NR) categories. All rating agencies provide specification for their own short –term FSR, rating modifiers and rating outlooks. However, Moody's does not use rating outlooks in their assessment.

Pottier and Sommer (1999) show that the determinants of the rating itself differ across rating agencies. However, these differences do not signify the superiority of one rating agency to the others (Eckles and Halek 2012). Despite all these variations (rating classifications and standards), there is a high congruence between the rating systems across these agencies (Trueck and Rachev 2009 and Hill et al 2010).

4.2 LOCATION OF STUDY AND TIME HORIZON

In 2013, the UK insurance industry generated approximately USD330 billion (Insurance Key Facts 2014) in premium income, making it the third largest insurance market in the world (after the United States and Japan) and the largest in Europe. Its shares in the world's insurance market accounted for 7.10%, which was a 2.37% increase from the previous year (Sigma No.3/2014). The industry is a key contributor to the UK economy and its tax take, which totaled up to £8.2 billion in the latest tax year (ABI 2013). It controlled 13.4% of investment in the London stock market and contributed a significant amount of income derived from its overseas business, which accounted for one-fifth of the net premium income, a total of £54 billion (£41 billion from long-term business and £13 billion from general business).

The UK insurance industry is a vital component of the nation's financial services industry. It is prudently regulated and is subject to the dual-regulatory approach. The aims of this prudent regulation are to ensure that policyholders are protected in all circumstances and to monitor the financial

performance and stability of these financial service providers. Despite all these measures, the UK insurance industry is still exposed and affected during the most recent financial crisis (Boyle 2013). Evidence of the impact has been discussed in Chapter 2 (refer to Figure 2.2.1.2). The impacts are measured using ID and IP, where there is a noticeable decline during the financial crisis periods (2007 -2009).

Thus, this study attempts to investigate the extent of the financial crisis impact on the financial performance of UK insurers. A comparative analysis is also included in the study. It compares the overall financial performance before and after the financial crisis. In order to achieve this purpose, the study will use data between 2006 and 2010 which are available and accessible from the Best database. This 5-year time horizon is deemed appropriate in order to reflect the financial performance of insurers before (leading to) the financial crisis and the consequences. The selected financial crisis breakpoint is justified in Section 4.4.

4.3 SAMPLE SELECTION

This is an UK-based study focusing on insurance companies that are licensed to transact business in the UK. To date, there are more than 900 insurers operating in the UK (ABI 2013). However, to obtain a rating is a voluntary exercise which involves significant costs (Pottier and Sommer 1999). Thus, not all insurers are motivated to obtain ratings. Insurer's financial strength rating could be seen as a signal for their financial strength. Good rating grades are associated with good financial performance and weak rating grades are linked with problems or distress in the financial performance.

The first part of the analyses aims to predict the insurer's rating transition matrices, specifically useful in identifying rating migration at a certain period, the heterogeneity of rating migration and the volatility level of the migration. The analysis is extended by incorporating a regression model that is used to

determine the financial characteristics that influence insurer's rating. For this part, a sample set is acquired from the A.M Best database.

The first sample contains the FSR of UK insurers over an eight year period starting from 2003 to 2010. This sample is obtained after screening the data available for this entire period. The data are screened in several stages. Firstly, the data are derived from unconsolidated financial statements. Secondly, captive insurance, branches of insurance firms, holding companies and reinsurance companies are omitted from the sample. Then, insurers who do not have complete data as required for the analysis are also excluded. After the initial screening process, there are 73 insurers with the most complete data over the time frame. Out of these 73 insurers, 16 are Lloyds Syndicates which are then excluded from the sample. The main reason of this omission is due to the characteristics of the Lloyds Syndicate itself. Instead of being real companies, these syndicates are only groups of insurance traders operating under the name of Lloyds. The final sample consists of 57 insurers operating in the UK.

The second part of the analyses attempts to evaluate the key determinants that influence the rating performance. The same sample set as in the ratings analysis will be used. However, for the purpose of the regression analysis, the study will utilize the financial data for these 57 insurers instead of the rating data as in the first part. The selection criterion is based on insurers with the most complete and available data over a five-year period starting from 2006 to 2010. Even so, the number of insurers that meet this criterion is restricted, thus this study is forced to adopt an alternative approach in order to expand the sample size. Hence, the second data set adopts an unbalanced panel data approach. This is similar to a previous study by Doumpos et al (2012) which uses unbalanced panel data set for the period of 2005 to 2009. However, their research focuses on macroeconomic variables to measure the financial performance of general insurers.

The original sample which consists of 57 insurers was further reduced to 49 insurers. This reduction is mainly due to limited data availability, where at

the time of data compilation, the financial data for the year 2010 were mostly not available. Hence, the sample size is reduced and the time horizon restricted to a four-year horizon, i.e. from 2006 to 2009. The panel data provided 190 observations over the four-year period. This is almost similar to the research conducted by Adams and Buckle (2003) on the Bermuda insurance market, which included 47 insurers/reinsurers over a five year period, i.e. 1993 to 1997.

As has been mentioned before, rating services can be quite costly and the rating process is a non-compulsory requirement to insurers. Thus, this could be a significant reason for the missing and unavailable data within the database, limiting the sample size and observations that could be undertaken. This could potentially lead to a skewed or biased sample.

4.3.1 Sample selection bias

The major concern with using datasets like A.M Best is the possibility of biases being introduced in the empirical analysis due to the non-random selection of samples (Heckman 1979). Individual units under observation are likely to get 'self-selected' leading to a bias in the empirical investigation.

The nature of the sample relies heavily on the nature of the A.M Best database. The method of sampling used in this study may systematically exclude a section of the population whose effect on the estimates and the associated inferences are quite different. In other words, the estimate is a function of a biased selected sample and is not a randomly drawn sample from the population. Additionally, analysts will be more likely to use samples like a panel of individual units or firms which data are available for a certain length of time. This is a customary practice to ensure the stability of the individuals under investigation. However, they may systematically omit certain sections of the population and thus lead to biased estimates for the population as a whole.

Nevertheless, following Heckman (1979), it can be formally shown that non-randomly selected samples lead to biased estimates and this can be treated as the problem of omitted variables.

4.4 JUSTIFICATION FOR THE FINANCIAL CRISIS BREAKPOINT

Another important element of the analysis is the comparative analysis between two distinctive periods, which are the pre-financial and post-financial crisis periods. Thus, a specific breakpoint between these two periods needs to be justified clearly. We specify a five-year time frame, starting from 2006 to 2010 in this study. This specification depends heavily on the availability of data. In our defense, these five-year periods are able to reflect the changes leading to the crisis, during the crisis and after the crisis. Detailed discussion on the financial crisis has been discussed in Chapter 3.

The crucial point of the UK financial crisis or credit crunch which started in mid-2007 was discussed by many economists and scholars' discussions (Barrell and Davis 2008, Mizen 2008, Martin and Milas 2009, Busch 2010, Erkens et. al 2010, Vriesendrop and Gramatikov 2010 and Evans 2011). In these papers, the onset of the financial crisis is pinpointed to mid-2007, July 2007 or the summer of 2007. Even though the financial crisis phenomena are not an uncommon event, the crisis during this period (2007 to 2010) is the largest and the worst since the Great Depression in 1929 – 1933 (Barrell and Davis 2008). Busch (2010) claims that the UK was exposed to a severe economic downturn in mid-2007 and was named one of the hardest hit countries in the western world with a projected budget deficit of 12.6% in 2008.

In a survey conducted by Vriesendrop and Gramatikov (2010), the dataset is divided into two periods, namely the "before" financial crisis and "after" financial crisis periods. In their survey, all data from 2004 to 2007 are pooled into the "before" crisis period and all data after year 2007 pooled into the "after" crisis period. Using a similar approach, O'Neill and Xiao (2012) evaluate the performance of 20 financial practices using data collected from 2005 to 2010. The sample in their study is divided in to two pools: the pre-

crisis pool (data from 01/01/2005 to 31/12/2007) and the post-crisis pool (data from 01/01/2008 to 31/12/2010). The crisis periods specifically adhere to the benchmark issued by the National Bureau of Economic Research (NBER 2008) which specifies that the crisis began in December 2007.

Accordingly, for the comparative analysis, the original dataset in this study is divided into two distinct categories, which are the pre-financial crisis (Pre-FC) and post-financial crisis (Post-FC) periods. It is decided that data up to the year 2007 (2006 and 2007) go into the pre-FC group and data for the year 2008 to 2010 are assigned to the post-FC group. The decision to include data for year 2007 into the estimation is supported by Baluch et al (2009), Elliott (2011) and Shah (2013).

Baluch et al (2009) study the effect of financial crisis on the UK insurance market. They explain that during the emerging financial crisis which started in mid-2007, insurance stocks have fallen as rapidly as banking stocks. However, the impact of the decline is more apparent in the late 2008. Elliott (2011) and Shah (2013) claim that due to the time lag, the effect of the financial crisis will only be visible in 2008. McKinnis (2002) acknowledges that the presences of *time lag effects* are common in panel data researches that deal with financial, economic, demographic and government policy variables. In this instance, the study will be using financial indicators derived from the financial statements.

Time lag effects could be defined as the interval between the onset of the financial crisis (the cause) and the impact of the crisis (the effect). Alternatively, it could be described as the delay between the time of an exposure onset, such as the onset of the financial crisis, and the subsequent outcome, such as the impact of the crisis on the financial institution (Gail 2005). Time lag effect is vital in the effectiveness of economic policy (Pettinger 2008). He illustrated that an interest rate cuts can take up to 18 months to have its full effect. In other words, it takes more than one year before any changes in the economy start to be visible. He also claims that the delay between an economic action and its consequences is inevitable.

Thus, it could be concluded that the impact of the financial crisis which breaks out in mid-2007 can only be assessed at a much later date, which could take up to 18 months after its onset. Subsequently, for the purpose of this study, the crisis year date or the breakpoint for the two groups is fixed at the end of 2007. This study will adopt a similar approach used by Vriesendrop and Gramatikov (2010) and O'Neill and Xiao (2012), which is to include the financial data for year 2007 into the pre-crisis pool.

4.5 THEORETICAL FRAMEWORK FOR THE RATING ANALYSIS

4.5.1 Data and Sampling

The rating analysis employs secondary data sources, which are rating data obtained from the A.M. Best Insurance Report Online – Non-US Database. The sample consists of 57 insurers. The sample selection is hindered by limited data availability. One-year access to the database (2010 – 2011) is purchased, which provides rating data from 2003 to 2011. However, data for 2011 are mostly incomplete and unavailable, thus the sample size is restricted to include all available data from 2003 to 2010.

There are two possible justifications for data limitation and unavailability. First of all, rating assessment is a voluntary practice and second of all, rating assessment by external rating agencies is expensive. A. M Best rating services are charged between US$5,000 to US$500,000. Thus, an insurer might not be motivated to apply for rating assessment if their company is having financial issues. Otherwise, even if an insurer is keen to apply for rating assessment, the rating fee might be unaffordable.

4.5.2 Theoretical Foundation

The Markov model is a stochastic model that describes a sequence of possible events in which the possibility of each event depends on the present event. The first known model is introduced by Singer and Spilerman (1976). It provides a convenient framework for analyzing

the structural mechanisms that underline social change and for extrapolating shifts in the state distribution of a population. It is most commonly used in the study of mobility (Singer and Spilerman 1976 and Shorrocks 1978) but could also be applied to diverse substantial areas. To date, the model has been used in many credit risks and pricing applications, focusing on the credit rating dynamics of firms (Berd 2005 and Frydman and Schuermann 2008). In its simplest form, Markov model is also known as the Markov chain-based model.

A Markov chain is a random process with a Markov property. The chain refers to a process which has a discrete (finite or countable) state space. It models the state of a system with a random variable that changes over time, which does not have any memory. This becomes the main element in the Markov property which is also known as ergodicity.

The term “ergodicity” is derived from the word “ergodic” which refers to a dynamic system which has the same behavior over time as averaged over space. This dynamic system has no memory, and the future of the process depends on the present but is independent of the past (Jarrow, Lando and Turnbull 1997). In terms of random variables, the evolution of a system can be forecast if the present state is known without having to rely on previous or historical states.

The Markov model is useful in decision-making problems where risk is continuous over time. It is also useful for cases where the timing of events is vital and for recurring important events (Sonnenberg and Beck 1993). It is assumed that all events are represented as transitions over time from one state to another, e.g. from A to B, from good to bad, etc. These transitions can be reflected using matrix algebra, cohort (discrete) estimations, transition matrices or as Monte Carlo simulation (McNulty and Levin 2000).

In this instance, the study adopts the cohort (discrete) estimation approach and this will be employed for estimating rating transition matrices (RTM). Although this method ignores the within-year transitions which may underestimate low-grade default intensities and overestimate high-grade ones, this method provides an overview of the evolution of the rating movements at a specific point of time (Kavvathas 2001). In addition, the cohort method has been used by many credit risk managers in order to predict future changes in their ratings (Xing et al 2012).

4.5.3 The Basic Properties of, and Estimation of Rating Transition Matrices (RTM)

4.5.3.1 The Basic Elements of RTM

RTM comprises of two primary elements, namely the choice of classification variables and the time horizon measurement (Deng et. al 2004). The first element refers to the criteria used to classify financial risk or credit risk of obligors. One of the criteria could be a single financial variable such as return on equity, which is a proxy to measure profitability. It could also be the composite index taken from many financial factors, such as credit scores.

The second element relates to the time horizon measurement or the length of time over which to construct one transition matrix (Barry et. al 2002). They found that ratings are more stable or have less extreme changes in shorter time horizon. However, it is likely to be affected by “noise” which could be eliminated in the long term (Bangia et. al 2002). Alternatively, longer time horizon will result in greater ratings’ volatility, which is due to diverse business operating conditions. Customary practice suggests that a common time horizon is one-year (Barry et. al 2002). It could be an “absolute’ one-year

measurement or a “pseudo” one-year, which is actually an average of several years’ data into a single measurement.

In this study, the criteria used to measure the financial strength of insurers will be the rating grades assigned by A.M Best rating agency to the insurers. This rating agency is selected based on its credentials as one of the oldest rating agencies which specialize as rating insurance companies worldwide (A.M Best 2010). It provides the most comprehensive insurance rating coverage as compared to other rating agencies, covering 95% of the US insurance market (Kartasheva and Park 2012). Its financial strength ratings evaluate obligors’ (insurers) ability to fulfill their obligations to policyholders. These ratings are mostly used by insurance brokers and included in various insurance contracts. Thus, rating changes which are reflected in A.M Best reports have a direct effect on the market perception with regard to the financial strength of an insurer.

Nonetheless, transition matrices could be estimated for any desired transition horizon (Bangia et al 2002 and Hadad et al 2009) It is most common to use annual data and 5-yearly data for analysis. According to Kryzanowski and Menard (2001), the time horizon of the analysis does influence the probability of a bond to remain at its initial rating. The longer the time horizon, the lesser the possibility of remaining unchanged.

4.5.3.2 The Properties of RTM

A Markov chain is a stochastic process based on a sequence of random variables $X_0, X_1, X_2, \ldots, X_n$ exhibiting the Markov property. There are two key features in a Markov chain. Firstly, the outcome of each experiment is one of a set of discrete states and secondly, the outcome of an experiment

depends only on the present state, and not on any past states. Markov chains are useful in analysing trends and predicting future outcomes.

A general definition could be written as follows:

$$\mathrm{P}(X_{n+1}|X_0, \dots, X_n = \mathrm{P}\ (X_{n+1}|X_n) \quad (1)$$

Where X_0, X_1, X_2, ..., X_n are the sequence of random variables. In this study, X_n denotes the rating grades included in the analysis. These rating grades are assigned to insurance companies by independent rating agency to reflect the financial performance of the insurer. The rating grades use a combination of alphabetical letters, numbers and mathematical operators (+ and -) as indicators of insurers' financial strength and ability. Altogether, there are eight rating grades evaluated in this study – A++, A+, A, A-, B++, B+, B and NR5. As shown in Table 4.1.2.1 (page 68), grade A++ is the most superior rating grade under the A.M Best rating evaluation. On the other hand, grade B signifies vulnerable position and NR5 is categorised in a different rating category, the Not Rated category (Table 4.1.2.2).

Based on Crossman et al (2009), a discrete time and discrete state space stochastic process is Markovian if and only if the conditional probabilities do not depend on (X_0, . . . , X_n) in full, but only on the most recent state of X_n. The probability of going to any next state at time $_{n+1}$ depends only on the state at time *n*. The system is said to be *memoryless*.

The possible values of X_n form a countable set *S,* which is called the *state space* of the chain. Following the approach of Jarrow, Lando and Turnbull (1997), a discrete time or time-homogeneous Markov chain has a finite state space *S* = {1, 2, …, k}. In this study, the state space *S* represents the different

rating grades. A state space of 1 denotes the best rating grade and a state space k represents the default case or the weakest rating grade. In this study, which uses A.M Best ratings, the state space 1 represents the highest A++ rating grade and the state space k denotes the NR state (insures with a No Rating category).

The probability of the rating transition process moving from state *i* to state *j* is denoted by P_{ij}. A matrix to depict this P_{ij} is known as the transition matrix of the Markov chain. A Markov transition probability model can precisely illustrate the evolution of these credit ratings. The model begins with a set of discrete quality credits ranges (states/ rating categories), into which all observations (e.g. firms or institutions) can be classified.

Let us presume that there is *K* discrete categories into which all observations can be ordered. This could be used to define a transition matrix, P_{ij}, as a matrix of probabilities depicting the likelihood of credit quality remaining unchanged or migrating to any of the other *K-1* categories over a given time horizon. In this instance, each element of the matrix, P_{ij}, shows the probability of credit quality being equal to *i* in period *t-1* and credit quality equal to *j* in period *t*. This discrete time, time-homogeneous finite state space Markov chain is specified by a *K x K* transition matrix, P_{ij} as follows:

$$P_{ij} = \begin{bmatrix} p_{11} & p_{12} & \dots & p_{1K} \\ p_{21} & p_{22} & \dots & p_{2K} \\ \vdots & \vdots & \dots & \vdots \\ p_{K-1,1} & p_{K-1,2} & \dots & p_{K-1,K} \\ 0 & 0 & \dots & 1 \end{bmatrix} \quad (2)$$

Based on Equation (2), P_{ij} denotes the transition probability of moving from state *i* at time *t-1* to state *j* at time *t*. The term homogeneous is often omitted when referring to “Markov

Chains". Furthermore, the basic properties for every Markov chain transition matrix are as follows:

$P_{i,j} \geq 0$ for all $i, j \in \{1, \ldots, k\}$, (3)

and

$\sum_{j=1}^{k} P_{i,j} = 1$ for all $i \in \{1, \ldots, k\}$ (4)

where $P_{i,j}$ refers to the transition probability of moving from state *i* to state *j*. Equation (3) states that transition probabilities must always be a non-negative value, while Equation (4) shows that all entries on one line are equal to 1 (Møller 2006).

Alternatively, Markov chains could also be described graphically, where the rows and columns are labeled by the probabilities of going from one state to the other states. The construction of the transition matrices is explained as follows. Conditional upon a given rating grade at time *t* (rows), the transition (or migration) matrix P is a description of the probabilities of being in any of the various grades at time *t+1*(columns).

There are eight rating grades evaluated in this study. The rating grades are A++,A+, A, A-, B++, B+, B, and NR5. Rating grade A++ is the most superior, which is followed by the rest. Rating grade NR5 is assigned to firms that are not formally evaluated. All these rating grades allow the estimation of 8 * 8 = 64 unique elements of matrix P; which is a conceptual interpretation as illustrated in Figure 4.5.3.2.1.

Note that the highlighted areas (along the diagonal lines) represent the areas which have no transition. In other words, any value that falls within the highlighted areas refers to the

probability of not having a rating change or maintaining the current rating grades.

Figure 4.5.3.2.1

Basic Structure of the Transition Matrix

		Grades at time *t+1* (To:)							
		A++	A+	A	A-	B++	B+	B	NR5
Grades at time *t* (From:)	A++								
	A+								
	A								
	A-								
	B++								
	B+								
	B								
	NR5								

Source: Author's compilation based on own dataset with reference to Bangia et al (2002).

4.5.4 Estimation Methods and Models

4.5.4.1 Rating Quality (Non-Markov Approach)

Scholars have been discussing the non-Markov approach to reflect rating dynamics (Lando and Skodeberd 2002, Hamilton and Cantor 2004, Dang and Partington 2005, Figlewski et al 2006, Hadad et al 2009 and Wang and Carson 2014). They present an alternative to the Markov model, by proposing that the direction of prior rating transition could influence future transition probabilities. Rating quality is an indicator that could be utilised to strengthen the rating transition results (Hadad et. al. 2009). They analyse rating activity and rating drift in order to support the non-Markovian assumption that the rating momentum does exist and rating transitions are influenced by both past and current events.

Rating activity and rating drift are good indicators for rating quality (Carty and Fons 1994). In addition, analysts should also examine the annual percentage of insurers affected by letter rating changes. Measurements of rating activity and rating drift are explained as follows:

Rating Activity (RA)

RA is one of the most important indicators in evaluating the quality trend of corporate ratings (Hadad et al, 2009). The purpose of RA is two-fold: it enables analysts to capture the effects of multiple rating changes for a single issuer within a given year and the relative size of rating changes. It also serves to evaluate the pace of rating change, based on units of letter ratings changed per issuer. RA can be measured by calculating the sum of all upgraded and downgraded letter rating changes divided by the number of issuer outstanding at the beginning of the given year (Carty and Fons 1994). The mathematical expression to define RA is as follows:

$$RA = \frac{(Total\ number\ of\ upgrades + Total\ number\ of\ downgrades)}{Number\ of\ insurers\ operating\ at\ beginning\ of\ the\ year} \quad (5)$$

Rating Drift (RD)

RD can be utilized to estimate the increase or decrease in aggregate credit quality. It summarises the overall increase or decrease in the credit quality of the rated sample as a percentage of one letter grade. According to Lando and Skodeberg (2002), RD is the dependency on previous ratings and can be characterised as a non-Markovian behavior. It is computed by aggregating the number of upgrades less the number of downgrades. The difference is divided by the number of issuers operating at the beginning of the given year

(Carty and Fons 1994). RD can be computed as in equation below:

$$RD = \frac{(Total\ number\ of\ upgrades - Total\ number\ of\ downgrades)}{Number\ of\ insurers\ operating\ at\ the\ beginning\ of\ the\ year} \quad (6)$$

A positive RD indicates that the number of upgrades has surpassed the downgrades, while a negative RD indicates that the number of downgrades has surpassed the upgrades (Hadad et a 2009). In this instance, a positive upgrade reflects an improvement in the rating quality and a negative upgrade reflects a decline in the credit quality. Thus, RD reflects rating improvement or decline over a particular period of time.

RA and RD analyses should be examined together with the annual percentage of issuers affected by letter rating. This additional test is an important indicator to reflect the overall trends of credit quality.

4.5.4.2 Rating Transition Matrices (Markov Approach)

To the best of author's knowledge, there has been little discussion about the application of rating transition matrices (RTM) to evaluate insurers' rating performance. To date, previous researches under this theme are conducted for the benefits of the rating agency. The most prominent studies are conducted by Pottier and Sommer (1999) and Gaver and Pottier (2005), which concentrate on firm-specific factors. A recent study by Wang (2010) focuses on the economic and industry cycle impacts on rating transitions.

RTM reflects the credit quality of a company by looking at the rating changes. The quality in question is either improving or deteriorating, reflected by the upgrading and downgrading of the letter rating obtained by a company (Hadad et al, 2009).

RTM is also used to explain the migration of creditor quality, as measured by proxies such as bond ratings (Jones 2005). Following this approach, this study uses RTM to explain the migration effect of insurers' quality, with the proxies being insurers' financial strength ratings (FSR).

The underlying principle in this estimation is as follows: given that there are N_i firms (obligors) in a given rating category *i* at the beginning of the year and that out of this population, N_{ij} have migrated to the category *j*, then the one year transition rate is estimated as:

$$P_{ij}\Delta = \frac{N_{ij}}{N_i}\ ,\ j \neq i\ , \qquad (7)$$

where N_i is the number of obligors in the rating grade *i* at the beginning of each time period and N_{ij} is the number of rating transitions from the rating grade *i* to rating grade *j* that are observed during the time period. $Pij\Delta$ reflects the probability estimate of transition from rating grade *i* to grade *j* over a specific time period. An important consequence of this is that if a transition from *i* to *j* does not occur in a given period, then the estimate of the corresponding rate is equal to 0.

In this study, the RTM will adopt the cohort method. It is assumed that rating transitions are Markovian, i.e. that rating transitions are ergodic and have no memory and that transition probabilities are time-homogeneous. Thus, it is possible to compute transition matrices for arbitrary time periods. The cohort method will also allow for a direct estimation of a one-yearly transition matrix which will be shown in the analysis.

Even though the cohort method has some limitations, it has been widely used in many credit risk and pricing applications in the literature. It has also been accepted as the basic, convenient and simple estimation method (Lando and Skødeberg 2002, Frydman and Schuermann 2008 and Engelmann and Ermakov 2011). We will also follow this conventional approach employed in the literature. In addition, the selection of the cohort method also arises due to the restricted access to data. The A.M Best database which has been purchased for this research only publishes yearly rating information and we have no access to real-time rating data changes.

In this study, the rating transition matrices will be estimated as:

i. Three-year transition matrix (2008 – 2010)
ii. Five-year transition matrix (2006 – 2010)
iii. Eight- year transition matrix (2003 – 2010)

The study will first attempt to estimate the total sample and then it will estimate the matrices according to the sub-sample. The sample will be divided into three sub-samples, according to the type of insurers.

In the comparative analysis, the sample will be clustered into two distinguished groups based on the specified crisis breakpoint periods. The comparative analysis uses five-year data, from 2006 to 2010. The breakpoint is specified at year “2007” thus, data from 2006 to 2007 will be grouped under the pre-financial crisis (Pre-FC) period. Data from 2008 to 2010 will be grouped under the post-financial crisis (Post-FC) period. It will also attempt total sample estimation and sub-sample estimation, according to the type of insurers.

4.6 THEORETICAL FRAMEWORK FOR THE REGRESSION ANALYSIS

4.6.1 Data and Sampling

The regression analysis employs secondary data sources, which are financial statement data obtained from the A.M. Best Insurance Report Online – Non-US Database. This analysis is an extension of the rating analysis, thus we use the same sample set as is in the rating transition analysis. The original sample consists of 57 insurers. However, the sample size is reduced to 49 insurers. The reduction is primarily due to limited data availability where at the time of the data compilation, financial data for the year 2010 were mostly not available. Thus, the final sample in this analysis includes 49 UK insurance companies which cover the period of 2006 – 2009. Table 4.6.1.1 summarises the sample selection according to type of insurance companies.

Similar to the rating analysis, the sample size for the regression analysis is restricted due to lack of data availability. This issue has been acknowledged in previous studies (Hadad et al 2009, Ismail 2013 and Burca and Batrinca 2014). Hence, the unbalanced panel data approach is adopted in order to expand the sample size.

Table 4.6.1.1

Summary of Insurers Included in the Sample According to Business Types

Business Type	2006	2007	2008	2009	Total (Obs.)
General insurer	39	39	39	35	152
Life insurer	7	7	7	5	26
Composite insurer	3	3	3	3	12
Total (Insurers)	49	49	49	43	190

Source: Author's computation.

Panel data or longitudinal data consist of two-dimensional observations, which are the time-series dimension and cross-sectional dimension (Hsiao 2005). Repeated observations over time are available for the same units of observation or individuals. The time-series dimension (T) is denoted as *t* and the cross-sectional dimension (N) denoted by *i.* By using panel data, we can get better estimations and we will be able to test for more sophisticated behavioural models, with less restricted assumptions (Baltagi 2013).

Theoretically, there are two types of panel data that can be used in a study. These are balanced panel data and unbalanced panel data. A panel is said to be balanced if there is an observation for every unit of observation, for every time period. A panel is unbalanced if some observations are missing (Dougherty 2011). There are pros and cons of using any one of the data set. If one is using an unbalanced panel, one needs to acknowledge the possibility that the causes of missing observations are endogeneous to the model. Similarly, if a balanced panel has been created artificially by eliminating all units of observations with missing observations, the data set may not be representative of its population.

Based on the sample in Table 4.6.1.1, the time-series dimension refers to the specific years included in the observation, which starts from 2006 and ends at 2009. Thus, T is equal to four. The cross-sectional dimension (N) refers to the number of companies included in the data, which are 49 companies. Based on the unbalanced panel data approach, researcher is able to expand the sample size, which includes 190 observations over the four-year period.

4.6.2 Choice of Dependent Variable (DV) and its Measurement

Following earlier studies (Adams et al 2003, Gaver and Pottier 2005, Eckles and Pottier 2011 and Kartasheva and Park 2012). This study relies on one commonly used measure of FSR performance, which is the rating grades (RATING) assigned by Best to the insurers over the

four-year period. Similar to bond ratings, insurer FSR is inherently ordered (Pottier and Sommer1999). The DV is the numerical conversion of the Best FSR from A++ to D. This conversion results in an ordinal DV. Becker and Kennedy (1992) and Katchova (2013) provide examples of ordinal DV, which include credit ratings, student grades and rating systems. Rating conversion has been used extensively in previous work, several of which are Morgan (2002) and Gu et al (2014).

In this study, rating grades are combined following the verbal descriptions provided by Best. Each rating grade is assigned an ordered numerical value accordingly, in a descending order. A higher value signifies a higher rating. Table 4.6.2.1 illustrates the rating distribution for the sample under observation.

Table 4.6.2.1

Ratings Distribution for 190 Observations, 2006-2009

Rating	Description	Numeric value	Number of observations
A++	Superior	5	18
A+	Superior	4	46
A	Excellent	3	63
A-	Excellent	2	46
B++	Very Good	1	6
B and below	Financially Vulnerable	0	11

Source: Author's computation

Based on the number of observations provided in Table 4.6.2.1, the sample shows a tendency for higher rating grades, between A++ and B++. There are only 11 observations under the financially vulnerable category (B and below). Following the verbal descriptions as in Best, A++ and A+ are grouped together under the "Superior" category, while A and A- are pooled into the "Excellent" category. However, the researcher made several adjustments to the categories. The researcher categorises A++, A+, A and A- into their respective

category so that it can depict the actual rating performance of the sample.

4.6.3 Choice of Explanatory Variables and Their Measurements

The choice of explanatory variables is based on their theoretical relationship with the dependent variable. This study accounts for firm-specific determinants that affect the financial strength rating performance of UK insurance companies. These explanatory (independent) variables, their measurement and their expected relationship to FSR are summarised in Table 4.6.3.1. Altogether, there are seven explanatory variables to be tested, six are financial variables and the other is a qualitative variables.

Table 4.6.3.1

Choice of Explanatory Variables (IV), Measurements and Expected Relation to FSR

	Variable(s)	Measurement / Sources	Expected Sign
1.	Leverage (LEV)	LEV is measured as the ratio of accumulated reserve to its total assets. Adams et al (2003), Van Gestel et al (2007) and Burca and Batrinca (2014)	-
2.	Profitabilty (PROFIT)	PROFIT is measured as the ratio of net underwriting expenses and losses to its net premium earned. Kashish and Kashram (19980 and Gaver and Pottier (2005)	+
3.	Liquidity (LIQUID)	LIQUID is measured as the ratio of current assets to its current liabilities. Shiu (2004), Almajali (2012) and Omondi and Muturi (2013)	+
4.	Company Size (LNSIZE)	SIZE is measured as the natural log of gross premium written. Van Gestel et al (2007), Ahmed (2011) and Charumathi (2012)	+
5.	Reinsurance (REINS)	REINS is measured as the ratio of annual reinsurance ceded to its net premium written. Wallace et al (1993), Ehrlich et al (2010) and Kuschel et al (2011)	+

	Variable(s)	Measurement / Sources	Expected Sign
6.	Growth (GROWTH)	GROWTH is measured by looking at the absolute change in the annual reported surplus. Adams et al (2003), Epermanis and Harrington (2006), Eling and Schmidt (2008) and Cole et al (2011)	+
7.	Business Type (TYPE)	This is a qualitative variable. TYPE is measured by using dummy variables: 0 = general (non-life) insurer 1 = life insurer Downs and Sommer (1997), Adams et al (2003) and Cole et al (2011)	+/- No definite association
8.	Organisational Form (FORM)	This is a qualitative variable. FORM is measured by using dummy variables: 0 = stock insurer 1 = mutual insurer Pottier and Sommer (1997), Van Gestel et al (2007) and Kartasheva and Park (2012)	+/- No definite association

Source: Author's compilation based on earlier studies.

4.6.4 Research Hypotheses

This study tests the following hypotheses, which were constructed based on prior empirical literature. In addition, the hypotheses are formulated based on the connections between the dependent variable and explanatory variables. The study attempts to provide answers to the following hypotheses:

All else being equal:

H1: Insurers with lower leverages will have a higher probability of obtaining a higher rating grade.

H2: Insurers with higher profits will have higher probability of obtaining a higher rating grade.

H3: Insurers with higher liquidity will have higher probability of obtaining a higher rating grade.

H4: Larger insurers will have higher probability of obtaining a higher rating grade.

H5: Insurers with higher amount of reinsurance held will have a higher probability of obtaining higher rating grade.

H6: Insurers with greater growth in annual surplus will have a higher probability of obtaining higher rating grade.

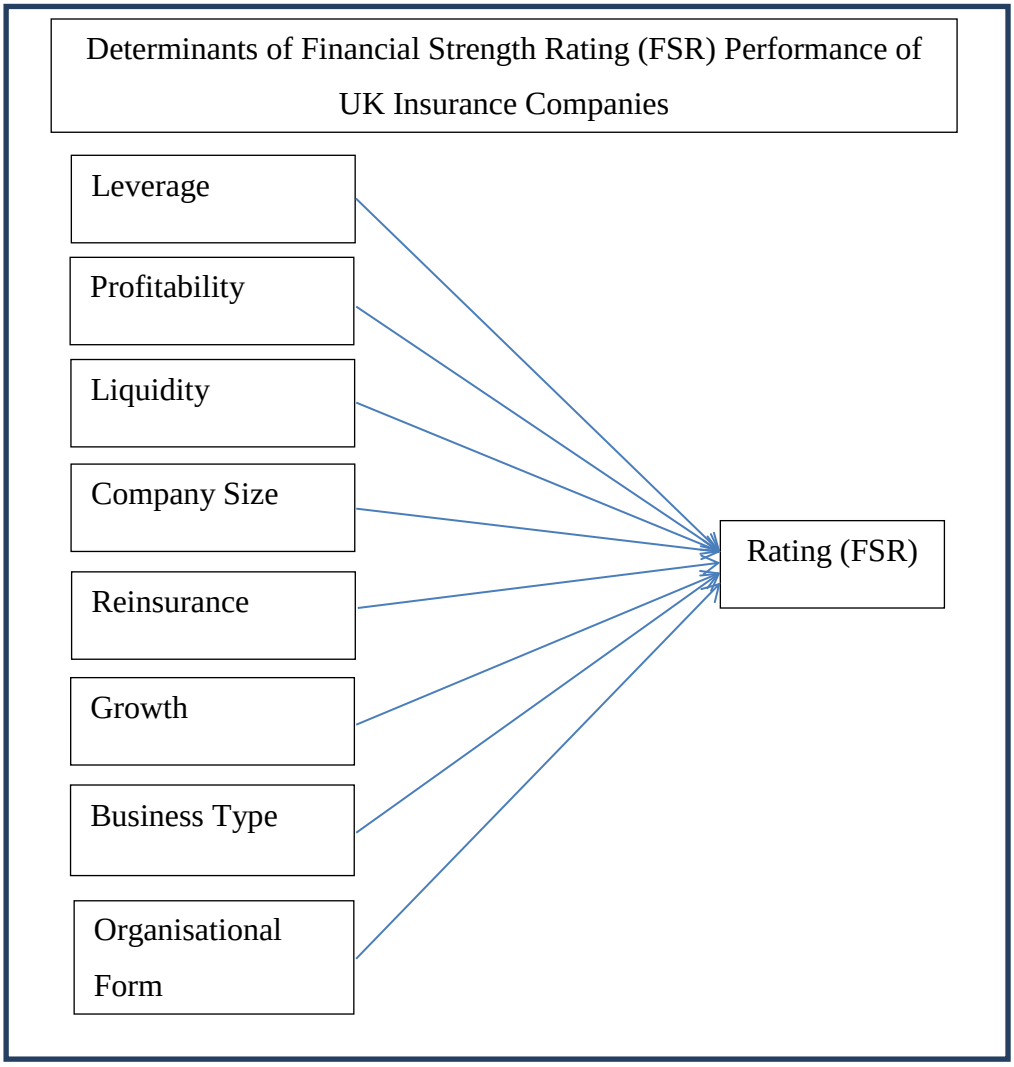
H7: General insurers (non-life) are more likely to be assigned a higher rating grade than life insurers

H8: Stock insurers are more likely to be assigned a higher rating grade than mutual insurers.

4.6.5 Research Model

The dependent variables (DV), explanatory variables (IV) and hypotheses lead to the construction of a research model as illustrated in Diagram 4.6.5.1.

Diagram 4.6.5.1
Research Model



4.6.6 Estimation Method and Model

The regression analysis is employed in order to analyse the key financial determinants associated with Best's ratings changes. It attempts to identify which among the financial determinants have the most influence on financial strength ratings, as reflected in the transition analysis.

A suitable regression model is developed to evaluate the financial determinants associated with the financial strength rating. It attempts to highlight the important determinants that influence the rating grades. Gaver and Pottier (2005) use a similar approach by conducting a one-year ordered probit regression model (OPM) for 80 US-based insurance companies. They find that there is a positive slope coefficient where insurers with higher independent variable (IV) values will be more likely to have higher rating grades and lower insolvency risk. However, the study is conducted based on a one-year data, which is a very short-term period with few observations.

This study employs the ordered probit regression model (OPM). The OPM is applicable to the case of more than two outcomes of an ordinal DV and is widely used in many analyses (Winship and Mare 1984, Jackson and Perraudin 2000 and Greene 2003). Since the DV used in this study conforms to the ordinal variable definition, the ordered probit model is used to estimate the regression for the variables hypothesised to be associated with these ratings. Alternatively, the ordered logit regression model (OLM) can also be used in the estimation. However, Torres-Reyna (2009) establishes that there is no significant difference between OPM and OLM, and both models provide similar results. Conversely, ordinal DV could not be estimated consistently using the ordinary least square regressions (OLS) (Greene 2003).

The model attempts to improve on previous approaches of Gaver and Pottier (2005) by using the panel data analysis and extending the time horizon by studying data from the year 2006 to 2009. The dependent variable (DV) is the six-category Best FSR (Gaver and Pottier 2005, Lopez 2007 and Eckles and Pottier 2011) which is considered as ordinal measures. There are eight independent variables which include two dummy variables to represent business type and organisational forms. The panel variable in this study is "Company ID" assigned by A.M Best.

Table 4.6.6.1

Variables Used in the Estimation

Variable(s)		Measured by:
Dependent Variable:		
RATING	Ordinal DV (FSR)	Ordinal variable categorised into the 0 = if the firm is assigned a Best rating of B 1 = if the rating is B++ or B+ 2 = if the rating is A- 3 = if the rating is A 4 = if the rating is A+ 5 = if the rating is A++
Explanatory Variables:		
LEV	Leverage	Accumulated reserve divided by total assets
PROFIT	Profitability	Net underwriting expenses and losses divided by net premium earned
LIQUID	Liquidity	Current assets divided by current liabilities
LNSIZE	Size	Natural log of gross premium written
REINS	Reinsurance	Annual reinsurance ceded divided by net
GROWTH	Growth	Change in surplus
TYPE	Business Type	Dummy variable 0 =general insurers, 1 = life insurers
FORM	Organisational Form	Dummy variable 0 = stock; 1 = mutual insurer
ε_{it}	Error Term	

Source: Author's compilation based on the empirical literature

Cizkowicz (2015) explains that time dummy allows to control for time-specific fixed effect while time trend is a variable to control for the exogenous increase in the dependent variable which is not explained by other variables. The objectives of this study do not focus on any time-specific effects. Thus, based on the literature, it is assumed that the "year dummy" is not required to be included in the OPM model. The model is amended appropriately. The "year dummy" is eliminated from the estimation (as shown in Equation (8) and (9)). All regressions follow the amended model accordingly. The variables included in the estimation model are defined in Table 4.6.6.1

The OPM is used to identify the relationship between the financial strength rating performance of insurance companies and leverage, profitability, liquidity, company size, reinsurance, growth, business type and organisational form. Our model construction is as follows:

Estimated model:

$$\boldsymbol{Rating_{it} = \beta_0 + \sum \beta_m (independent\ variable_m) + \varepsilon_{it}} \quad (8)$$

where *Rating*$_{it}$ is the ordinal, dependent variable (DV) and it is coded on a six-point scale from 0 to 5. The *independent variables* are LEV, PROFIT, LIQUID, LNSIZE, REINS, GROWTH and FORM. The estimated model also includes λ_t that represents year (time variable) and ε_{it} that represents the error term. Thus, the equation to be estimated could be expressed in detailed as:

$$\begin{aligned} Rating_{it} = {} & \beta_0 + \beta_1 LEV_{it} + \beta_2 PROFIT_{it} + \beta_3 LIQUID_{it} + \\ & \beta_4 LNSIZE_{it} + \beta_5 REINS_{it} + \beta_6 GROWTH_{it} + \\ & \beta_7 TYPE_{it} + \beta_8 FORM_{it} + \varepsilon_{it} \end{aligned} \quad (9)$$

Additionally, the study compares the probit model that explains the financial strength rating performance on the basis of standard error estimation (Regression 1) with a probit model that explains the performance on the basis of robust standard error estimation (Regression 2). This comparison has been attempted in previous studies in order to test for the robustness of the analysis (Grunert et al 2005 and Eckles and Pottier 2011). It is also an advantage to test the model based on its type of insurance business – general, life and composite insurance companies, as in Kartasheva and Park (2012). However, the model will specifically focus on general insurers due to data limitations.

CHAPTER 5

EMPIRICAL ANALYSIS AND DISCUSSIONS

This chapter deals with ample empirical analysis and discussions about the findings from the analysis. There are two parts in this chapter. First off, the rating analyses that focus on the construction of rating transition matrices (RTM). Secondly, the regression analyses seeking to identify the determinants that influence rating performance. The comparative analyses that cover two different periods, namely the pre-financial crisis (Pre-FC) and post-financial crisis (Post-FC) period will also be performed. The comparative analysis attempts to identify changes in insurance companies' performance as reflected in the ratings assigned to them.

5.1 EMPIRICAL STRATEGIES.

Table 5.1.1

Research Objectives, Research Questions and Empirical Analysis Strategies

	Research Objectives	Research Questions	Data Analysis Strategy
1.	To investigate the probability of change in an insurer's financial performance, as reflected in rating changes.	What is the probability of a rating change?	Descriptive Analysis Rating Quality Rating Transition Matrices (RTM)
2.	To compare insurers' rating performance between pre-financial crisis and post-financial crisis periods.	Does the rating performance differ between the pre-financial crisis and post-financial crisis?	Descriptive Analysis Comparative Analysis using RTM
3.	To identify which financial determinants have the greater influence on the financial strength rating as reflected by the transition analysis.	Which financial determinants have the greater influence on the financial strength rating?	Descriptive Analysis Regression Model using Ordered Probit Regression Model (OPM)
4.	To compare and contrast the financial strength rating performance between two financial periods, viz. the pre-financial crisis and post-financial crisis.	Does the financial strength rating performance differ between the pre-financial crisis and post-financial crisis periods?	Descriptive Analysis Comparative Analysis using OPM

Source: Author's compilation

The objectives, research questions and chosen analysis are summarised in Table 5.1.1. This is a summary about the intentions for this chapter. Empirical analyses will be preceded by an appropriate descriptive analysis. In addition, a suitable diagnostics test will also be included in the discussion.

The aims of the rating analysis are to estimate the rating transition matrices, specifically used to identify rating transition at a certain period and to compare rating transition between two particular periods. The empirical analysis should be able to answer the following research questions - (1) What is the probability of a rating change? and (2) Do rating performances differ between the pre-FC period and post-FC period?

5.2 DESCRIPTIVE ANALYSIS FOR RATING DATA

5.2.1 Number of Insurers by Type of Business

Table 5.2.1.1

Number of Insurers by Type of Business from 2003 to 2010

Type / Year	General	Life	Composite	Total (Insurer)
2003	37	7	6	50
2004	39	7	6	52
2005	40	7	6	53
2006	42	7	6	55
2007	43	7	6	56
2008	44	7	6	57
2009	44	7	6	57
2010	44	6	6	57
Total (Obs.)	334	55	48	**437**

Source: Author's computation

Table 5.2.1.1 shows the number of insurers by type of business from 2003 to 2010. The data depicts changes in the total number of insurers by year. There were a total of 50 insurers in 2003 relative to 57 insurers in the last consecutive three years – 2008, 2009 and 2010.

The difference is acknowledged because the number of insurers in the sample depends on those who have been assigned ratings during the period of observation. The sample selection is heavily based on data availability and not by any other preferences. This study includes all insurers that have the most available and complete data between 2003 and 2010; based on an unbalanced panel data approach. Following this approach, the total number of observations (Obs.) is 437 observations.

Rating assignment is a voluntary practice and expensive (Kartasheva and Park 2012). Thus, an insurer is neither inclined nor forced to maintain the annual rating assessment without particular motives. One example of a motive to obtain rating is to signal good financial performance to the market in order to secure new business growth and lower the market cost of capital. Additionally, an insurer might be motivated to obtain rating to derive the benefits from the rating process, which is to resolve agency conflict and to reflect on prudent managerial and financial practices (Adams et. al 2003 and Kisgen 2007).

There were 37 general insurers in 2003 and the number had risen slowly to 44 in the last consecutive three years. Conversely, life and composite insurers depict more stable distributions. There were seven life insurers (except in 2010) and six composite insurers throughout the 8-year observation periods. The sample is dominated by larger numbers of general insurers relative to the others. This conforms to the hypothesis that general insurers are more likely to be rated than life insurers (H7).

5.2.2 Rating Conversion

In the initial analysis, rating grades are converted into equivalent numerical scales which provide a total of eight ordinal rating categories, as in Table 6.2.2.1. The rating grades and descriptions correspond to the descriptions used by A.M. Best. Each rating grade

is allocated an ordered numerical value due to the ordinal nature of the variables. Rating conversion has been employed in other studies such as Eckles and Pottier (2011) and Kartasheva and Park (2012).

Table 5.2.2.1

Rating Conversion, 437 Sample Observations, 2003 - 2010

Rating	Description	Numeric value	Number of observations
A++	Superior	1	36
A+	Superior	2	93
A	Excellent	3	133
A-	Excellent	4	120
B++	Good	5	25
B+	Good	6	6
B	Fair	7	1
NR5	Not formally followed	8	23

Source: Author's computation

As shown in Table 5.2.2.1, over 87% of sample insurers are rated "A-" and above (total number of all observations for A- and above, relative to total observation). The large percentage implies that most insurers in the sample are assigned with higher rating grades. This could be an indicator that the sample consists of insurers with good financial performance. Conversely, the conversion also includes a "NR5" rating grade. The "NR5" grade is assigned to insurers with conditions that could impede the rating assessment process. Examples of these conditions include insufficient data (NR1), company's request to be omitted from the assessment (NR3), and not formally followed (NR5) (A. M. Best 2010). The "NR5" grade is accounted in the sample primarily due to their remarkable rating progression, i.e. from "NR5" to "A-"within the observation periods.

5.2.3 Rating Grades Assigned by Type of Business

Following the rating conversion, Table 5.2.3.1 exhibits the distribution of rating grades assigned, relative to the type of insurance business. There are eight rating grades (A++, A+, A, A-, B++, B+, B and NR5)

assigned to insurers (general, life and composite) in the sample. The unbalanced panel yields 437 observations.

Table 5.2.3.1

Rating Grades Assigned by Type of Business

Type / Grade	General	Life	Composite	Total (Insurer)
A++	35	0	1	36
A+	56	20	17	93
A	103	16	15	133
A-	96	13	11	120
B++	20	5	0	25
B+	1	0	5	6
B	1	0	0	1
NR5	22	1	0	23
Total (Obs.)	334	55	48	**437**

Source: Author's computation

It appears from Table 5.2.3.1 that almost all insurers in the sample secure good rating grades where the distribution concentrates on grade "A-" and above. General insurers depict a widespread rating distribution since they have observations in all rating categories, with most observations lie on "A-" and above.

5.2.4 Number of Insurers According to Rating Grades and Year

Table 5.2.4.1

Number of Insurers According to Rating Grades from 2003 to 2010.

	2003	2004	2005	2006	2007	2008	2009	2010	Obs.
A++	5	4	5	5	5	4	4	4	36
A+	7	15	13	14	14	14	8	8	93
A	13	6	9	11	14	18	30	32	133
A-	13	15	15	19	18	17	12	11	120
B++	4	7	7	1	1	1	2	2	25
B+	1	2	1	1	1	0	0	0	6
B	1	0	0	0	0	0	0	0	1
NR5	6	3	3	4	3	3	1	0	23
Total	50	52	53	55	56	57	57	57	437

Source: Author's computation

The study employs the frequency analysis to determine the number of insurers under each rating category by year. Table 5.2.4.1 depicts a summary of all UK insurers that have been assigned the "Financial Strength Rating" (FSR) from 2003 to 2010.

Data in Table 5.2.4.1 are further simplified to highlight the difference between two different points of observation; namely 2003 and 2010. The summary is presented in Table 5.2.4.2.

Table 5.2.4.2

Differences in Data in 2003 and 2010

	A++	A+	A	A-	B++	B+	B	NR5
2003	5	7	13	13	4	1	1	6
2010	4	8	32	11	2	0	0	0

Source: Author's compilation

Data in Table 5.2.4.2 show that most insurers achieved good ratings in most years; with grades A+, A and A- being the most frequent ratings. Scores in year 2003 were the most varied, with insurers being rated in all categories. In contrast, scores in year 2010 were less varied but with more concentration rested on the better ratings (B++ and above).

According to Best's rating categories, rating grades of B+ and above are placed in the "Secure" category. Accordingly, rating grades of B and lower are placed in the "Vulnerable" category (A.M. Best 2010) The bold, horizontal/vertical line between grade "B+" and "B" in Table 5.2.4.1 and Table 5.2.4.2 differentiates the grades according to the secure and vulnerable groups as specified by Best. The summary in Table 5.2.4.2 highlights a distinct difference, whereby in 2003, there were 43 insurers in the "secure" category and seven insurers fell into the "vulnerable" category. Interestingly, all 57 insurers managed to be placed in the "secure" category in 2010.

The improvement in rating scores could be justified because most insurers are well aware of the advantages of obtaining good ratings and they will make significant attempts to improve their financial base, in order to obtain the highest possible rating grades. Superior rating grades play an important role in influencing the market and customers about their financial strength and stability that contribute significantly to profitable business opportunities. This is consistent with Adams et al (2003) and Kartasheva and Park (2012) that highlight the advantages of obtaining rating grades.

5.3 RATING QUALITY (NON-MARKOV APPROACH)

Rating quality is an indicator that could be utilised to strengthen the rating transition results (Hadad et. al., 2009). These analyses support the non-Markovian assumption that rating momentum does exist and rating transitions are influenced by past and current events. Subsequently, rating activity (RA) and rating drift (RD) are good indicators for rating quality (Carty and Fons 1994).

In addition, analysts should also examine the annual percentage of insurers affected by letter rating changes. It is useful to detect improvement in rating performance on an annual basis, as for it to become a good starting point to evaluate rating activity and rating drift.

The first objective attempts to investigate the probability of rating changes. Subsequently, it seeks answer to the question – what is the probability of a rating change? Rating change could be defined as changes to a higher rating grade (upgrade) or changes to a lower rating grade (downgrade).

Table 5.3.1

Rating Changes by Year, 2003 - 2010

	Upgrades		Downgrades		Rating Activity	Rating Drift
Year	Number	%	Number	%	(RA) %	(RD) %
2004	10	17.54	4	7.02	27.45	11.76
2005	10	17.54	3	5.26	25.00	13.46
2006	4	7.02	2	3.51	11.32	3.77
2007	9	15.79	1	1.75	18.18	14.55
2008	4	7.02	0	0	7.14	7.14
2009	4	7.02	3	5.26	12.28	1.75
2010	9	15.79	7	12.28	28.07	3.51
Average:	7	12.53	3	5.01	18.49	7.99

Source: Author's computation

Table 5.3.1 summarises the number of insurers and the percentage of rating changes, as well as the activity and drift measurements for all insurers in the sample. The outcomes are estimated according to the non-Markovian approach, assuming that rating changes are influenced by past events. Note that the evaluated outcomes start at 2004 and not 2003. This is necessary since data for the year 2003 serve as the basis of comparison with data for the year 2004. Due to data restrictions, the researcher does not have data for the year leading to 2003, thus changes in 2003 have not been captured in the analysis.

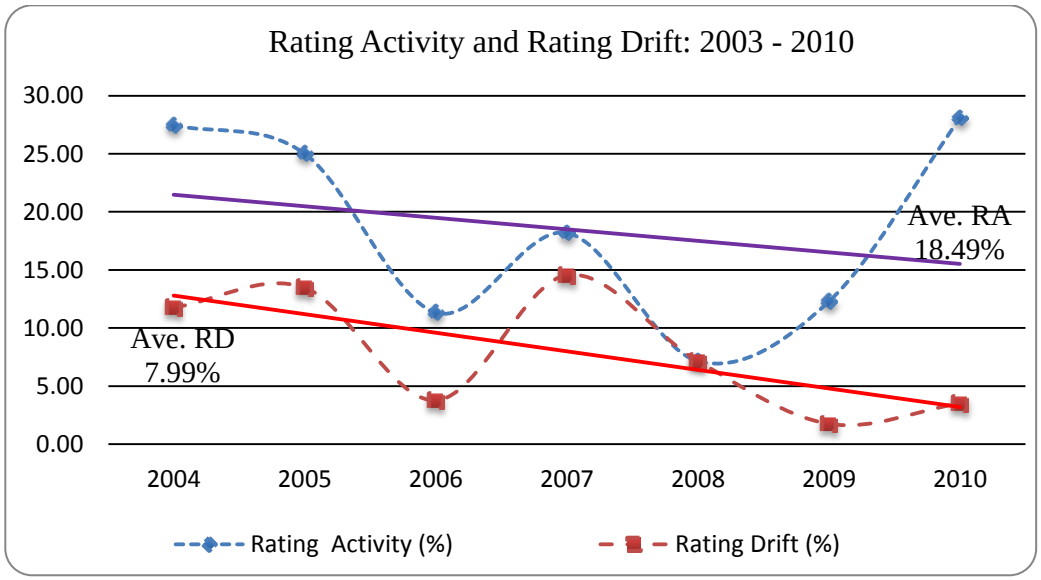
Table 5.3.1 also highlights the annual rating changes for insurers in the sample over the period of 2003 – 2010. The average scores are computed as the total sums in each column relative to the observation period (7 years, 2003 as the basis of comparison). A general conclusion shows that rating upgrades surpass the rating downgrades in all year. Over the entire period, rating upgrades averaged 12.53% per year and rating downgrades averaged 5.01% per year. This finding answers our first research question – that there is a higher probability of a rating upgrade than a rating downgrade. In addition, it

corresponds to the findings from previous studies (Carty and Fons 1994 and Hadad et al 2009).

Data for Figure 5.3.1 are based on the computations of RA and RD which are presented in Table 5.3.1, whereby it is concluded that RA and RD are highly pro-cyclical. RA averaged 18.49% per year and RD averaged 7.99%. The average trend lines are also included in Figure 5.3.1. RA depicts the relative size of rating changes and the speed of rating changes. RA was the highest in 2010 (28.07%) and lowest in 2008 (7.14%), in the span of two years. This could be a good sign that the quality of insurers' rating is improving at a remarkable speed.

Figure 5.3.1

Rating Activity (RA) and Rating Drift (RD) for All Insurers, 2003 - 2010



Source: Author's computation

RD summarises the overall increase/decrease in the credit quality of the rated insurers in the sample as a percentage of one letter grade. In this instance, RD was the highest in 2007 (14.55) and lowest in 2009 (1.75%), also in the span of two years. The lowest value could be linked to the effect of the financial crisis which occurred in mid-2007, where most insurers experienced or were exposed to financial

vulnerabilities. RD scores following the crisis show a drastic decline, from 14.55% (2007) to 7.14% (2008) and it dropped to 1.75% (2009). The score improved slightly in 2010 (3.51%), indicating an improvement in the overall credit quality of the insurers.

As a conclusion, findings from the rating quality analysis provide early indicators of the rating performance and contribute to answer the research questions as follows:

i. There is a higher probability of rating upgrades than rating downgrades. (Answering research question 1)
ii. There is a notable difference in the rating performance between the pre-financial and post-financial crisis periods. (Answering research question 2)

In addition, the findings conform to the underlying assumptions of the non-Markov approach where the direction of prior rating transition could influence future transition probabilities, as reflected in the analysis (Lando and Skodeberd 2002, Hamilton and Cantor 2004, Dang and Partington 2005, Figlewski et al 2006, Hadad et al 2009 and Wang and Carson 2014).

5.4 RATING TRANSITION MATRICES

In this analysis, the rating transition matrices (RTM) will be estimated as:

i. Eight-year transition matrix (RTM 2003 – 2010)
ii. Five-year transition matrix (RTM 2006 – 2010)
iii. Three- year transition matrix (RTM 2008 – 2010)

Bangia et al (2002) establish that transition matrices can be estimated for any desired transition horizon. However, a shorter measurement interval reflects lesser transitions and less extreme movements. The justification for the different time settings for all matrices is to investigate rating transitions at various time settings. In this case, each matrix is differentiated in terms of its

duration, short-term transition (three years), long-term transition (five years) and overall transition (eight years). It is predicted that there will be significant differences in the result that will be able to answer the research question – what is the probability of a rating change?

The discussion will include another measurement of rating quality, which is the rating magnitude. Rating magnitude (RM) is the degree of change from one letter rating to another. As an example, a rating change from A++ to A+ represents a 1-rating magnitude and a rating change from A to A++ represents a 2-rating magnitude (regardless of an upgrade or a downgrade). It is useful to reflect the extent of rating transition, irrespective of the movements. It could reflect the magnitude of a rating upgrade or the magnitude of a rating downgrade (Hadad et al 2009)

After the overall estimations, the study will attempt to estimate the transition matrices according to their types of business. There are three types of insurers in the sample – general, life and composite insurers. All sub-samples will be estimated on the most recent five-year time period, from 2006 to 2010, as follows:

i. RTM for general insurers (RTM General)
ii. RTM for life insurers (RTM Life)
iii. RTM for composite insurers (RTM Composite)

Hadad et al (2009) state that the most commonly used matrix is based on the annual or five-yearly observation periods. This serves as the basis for the analysis, which focuses on five-year transition matrices, according to type of business. It is predicted that there will be a significant difference in rating transitions relative to the type of business.

The descriptive characteristics of the data used for estimating all matrices are summarised in Table 5.4.1. The summary provides detailed information on the data that are being used in each transition matrix by highlighting the number of observations (N*), number of companies (n*) and duration of

study (T). In addition, the characteristics of the data set (balanced vs. unbalanced panel) are also mentioned. An unbalanced panel arises out of data unavailability. Thus, all companies with at least three-year complete data are accounted in the sample.

Table 5.4.1

Descriptive Characteristics of the Data Used in the Transition Matrices

Group	N*	n*	T (year)	Year of observation(s)	Characteristics of data
All insurers	437	57	8	2003 - 2010	Unbalanced panel
All insurers	282	57	5	2006 - 2010	Unbalanced panel
All insurers	171	57	3	2008 - 2010	Strongly balanced panel
General only	218	45	5	2006 - 2010	Unbalanced panel
Life only	34	7	5	2006 - 2010	Unbalanced panel
Composite only	30	6	5	2006 - 2010	Strongly balanced panel

N* refers to number of observations over the analysis duration, which is derived from n* x T
n* refers to number of insurers in the dataset

The full sample consists of 437 observations taken from 57 insurers over the eight-year period. However, the data are regarded as unbalanced, indicating that there are some missing data in the sample. Due to data limitation, the sample accounts for 57 insurers with almost complete data over the eight-year period. An insurer with incomplete data but who has at least three-year data is also included in the sample. This is done in order to increase the sample size and generalisability of the outcomes.

The highlighted cells in these matrices indicate areas with “NO TRANSITION”, i.e the rating grade remains at the current rating grade category. All companies have a higher possibility of remaining at their current rating category if higher percentages are shown along the diagonal (the highlighted areas) (Carty and Fons 1994 and Schuermann and Jafry 2004).

5.4.1 Eight-Year Rating Transition Matrix

Table 5.4.1.1

Eight-Year Rating Transition Matrix (%)

All Insurers, 437 observations, 2003 - 2010

	Rating: To(%)							
From (%)	A++	A+	A	A-	B++	B+	B	NR5
A++	**93.75**	6.25	0	0	0	0	0	0
A+	1.18	88.24	**10.59**	0	0	0	0	0
A	0	7.92	88.12	2.97	0	0	0	0
A-	0	0	**15.60**	83.49	0.99	0	0	0.92
B++	0	0	0	**30.43**	69.57	0	0	0
B+	0	0	**16.67**	**16.67**	0	66.67	0	0
B	0	0	0	0	**100.00**	0	0	0
NR5	0	0	8.70	8.70	8.70	4.33	0	69.57

Note: “B” rated insurers managed to migrate from its current rating grade (B) to grade B++. However, the column for “B” grade is included for ease of observation.

Outcomes in Table 5.4.1.1 reflect that the probability of A++ insurers having their rating unchanged is 0.9375, while there is a small (0.0625)[i.e 1 – 0.9375] probability of a downgrade. Some of the interesting outcomes are presented in **bold**. For the A-, B++ and B+ rating grades, the probability of upgrades exceeds that of downgrades, i.e insurers with B++ rating grade have 0.3043 probability of obtaining a higher grade (grade A-). It shows that rating grades around the mid-range (A, A-, B++ and B+) are more likely to experience rating changes, as reflected in the matrix.

In contrast, insurers with higher ratings tend to maintain their position, with smaller chances of rating transition. Interestingly, in the prediction, B rated insurers in the sample show remarkable chances (prob=1.000) to improve their rating grade, up to 2-rating magnitude (i.e. from grade B to B++, the difference is two grades higher). Another noteworthy finding is that NR5-rated insurers’ exhibit a total probability of 0.3043 [i.e. 1 – 0.6957] to be upgraded into better rating categories. These possible upgrades will be a signal to the public on the improvements made by the NR5 rated insurers and will help to boost company’s profile.

5.4.2 Five-Year Rating Transition Matrix

Table 5.4.2.1

Five-Year Rating Transition Matrix (%)

All Insurers, 282 observations, 2006 - 2010

	Rating: To(%)						
From (%)	A++	A+	A	A-	B++	B+	NR5
A++	**94.44**	5.56	0	0	0	0	0
A+	0	84.00	**16.00**	0	0	0	0
A	0	1.37	97.26	1.37	0	0	0
A-	0	0	**19.70**	80.30	0	0	0
B++	0	0	0	**20.00**	80.00	0	0
B+	0	0	**50.00**	0	0	50.00	0
NR5	0	0	9.09	18.18	9.09	0	63.64

Note: No companies fall into the rating category B for the years observed thus the column for grade B is omitted from the table.

The five-year transition matrix is presented in Table 5.4.2.1. Similar to Table 5.4.1.1, this matrix attempts to depict rating movements over the long run (duration of 5 year or more). The analysis shows that the probability of A++ rated insurers remaining at their current rating grade is 0.944, with only a slight chance of downgrades (prob=0.0556). Again, it is a reflection that the A++ rated insurers have an extremely stable rating performance, with the probability of unchanged rating almost 1.00.

Similar to findings in Table 5.4.1.1, the probability of upgrades for A- and B++ rated insurers surpasses its downgrades. In addition, B+ rated insurers have the opportunity of 3-rating magnitude (moving from grade B+ to A- involves three grade differences) to be upgraded to higher rating grade. Surprisingly, A+ rated insurers are vulnerable to rating downgrades (prob=0.16 in Table 5 and prob=0.1059 in Table 8). It is difficult to determine the reason for this probability of downgrades since the matrix only analyses rating transitions but it does not provide any justifications for the transitions.

5.4.3 Three-Year Rating Transition Matrix

Table 5.4.3.1

Three-Year Rating Transition Matrix (%)

All Insurers, 171 observations, 2008 - 2010

	Rating: To(%)					
From (%)	A++	A+	A	A-	B++	NR5
A++	**100.00**	0	0	0	0	0.00
A+	0	68.18	**31.82**	0	0	0.00
A	0	2.08	**97.92**	0	0	0.00
A-	0	0	**27.59**	72.41	0	0
B++	0	0	0	0	**100.00**	0.00
NR5	0	0	0	50.00	25.00	25.00

Note: No companies fall into the rating category of grades B+ and B for the years observed thus column for grades B+ and B are omitted from the table.

Table 5.4.3.1 depicts the transition matrix in short-run, 3-year observations from 2008 to 2010. Outcomes from the matrix show that A++ rated insurers remain steadfast with a remarkable chance of remaining in the current rating position. In addition, B++ rated insurers are also predicted to have a stable outlook, by having their rating unchanged (prob=1.000). This is slightly different relative to the rating performance in the other two periods (8-year and 5-year). In this estimation, A- insurers also depict chances of rating upgrades (prob=0.2759). This positive rating outlook corresponds to the findings in Table 8 and Table 5.

In contrast, A+ rated insurers are still susceptible to the rating downgrade (prob=0.3182) in the short-run. This percentage of downgrade (31.82%) is the worst compared to the other two periods (8-year and 5-year). It indicates that A+ rated insurers experience deterioration in their financial performance, as reflected in their rating downgrades. It is worth mentioning that NR5-rated insurers also have greater probabilities of obtaining good ratings in the rating assessment. The total probability of upgrades is 0.3636 [i.e 1 – 0.6364].

5.4.4 Overall Conclusions for Rating Transition Matrices for All Insurers

Findings from Table 5.4.1.1, Table 5.4.2.1 and Table 5.4.3.1 can be concluded as follows:

i. A++ rated insurers reflect the strongest performance in all periods of observations (eight-year, five-year and three-year). The probability on remaining at their current rating grade is very high, with probability scores of more than 0.9300. The findings conform to Carty and Fons (1994) that the higher-quality ratings have a higher likelihood of remaining unchanged than the lower-quality ratings.

ii. Interestingly, from all three estimations, A-, B++ and B+ depict greater chances of rating upgrades relative to the downgrades. Thus, it can be concluded that for any of the given time horizons, insurers with these rating grades (A-, B++ and B+) tend to obtain higher ratings at the end of the period. In addition, mid-range rating grades tend to be more changeable as compared to the other grades.

iii. A+ grade is defined as “superior” grade and is assigned to insurers with superior financial position (A.M. Best 2010). Despite their superior financial position (as reflected in the rating grade), these insurers are exposed to higher chance of rating downgrades in all estimations. Thus, the contradicting results for A+ rated insurers require further investigation.

iv. Frydman and Schuermann (2008) highlight that the reason for an insurer to be assigned an NR-grade is unknown. The NR-grade itself does not reflect “good’ or “bad” rating performance. In this study, NR5-rated insurers show remarkable chances of rating upgrades in all three estimations. Thus, it is concluded that in this study, NR-rated insurers do not signify poor financial performance.

As a conclusion, outcomes from these analyses reflect higher probabilities of rating upgrades which are achievable if the insurers show remarkable improvements in their financial performance. Thus, the outcomes managed to answer the first research question, that there is a higher probability of a rating change, which concentrates more on rating upgrades.

5.4.5 Rating Transition Matrices According to Type of Insurers.

Table 5.4.5.1

Descriptive Characteristics of the Data Used in Transition Matrices

Group	N*	n*	T(year) 2006 to 2010	Characteristics of data
General only	218	45	5	Unbalanced panel
Life only	34	7	5	Unbalanced panel
Composite only	30	6	5	Strongly balanced panel

N* refers to the number of observations for the 5-year period.
n* refers to the number of insurers included in the sample.

Table 5.4.5.1 provides a brief summary of the sample used in the transition matrices. The sample is sub-divided into types of business, which are general, life and composite. The descriptive characteristics are summarised in Table 5.4.5.1. It is obvious that general insurers dominate the sample and data unavailability is apparent with the application of unbalanced panel data.

Table 5.4.5.2 illustrates the transition matrices according to the type of insurers. The matrices are compiled for ease of observation. Values in bold indicate significant findings that will be discussed. Discussions begin with individual analysis, discussing trends in each and every matrix and then it will provide conclusions on the overall trends of the transition matrices.

Table 5.4.5.2
Rating Transition Matrices According to Type of Insurers

Matrix A
Rating Transition Matrix (%)
General Insurers, 218 Observations, 2006 - 2010

	Rating: To(%)					
From (%)	A++	A+	A	A-	B++	NR5
A++	**94.44**	5.56	0	0	0	0
A+	0	86.21	**13.79**	0	0	0
A	0	0	**98.25**	1.75	0	0
A-	0	0	**18.87**	81.13	0	0
B++	0	0	0	**20.00**	80.00	0
NR5	0	0	9.09	18.18	9.09	63.64

Note: No companies fall into rating grades B+ and B during the observation period (2006 to 2010). Thus, rows/columns for rating grades B+ and B are omitted from the table.

Matrix B
Rating Transition Matrix (%)
Life Insurers, 34 Observations, 2006 - 2010

	Rating: To(%)		
From (%)	A+	A	A-
A+	66.67	**33.33**	0
A	0	**100.00**	0
A-	0	**22.22**	77.78

Note: No companies fall into rating grades A++, B++, B+, B and NR5 during the observation
period (2006 to 2010). Thus, rows/columns for these rating grades are omitted from the table.

Matrix C
Rating Transition Matrix (%)
Composite Insurers, 30 Observations, 2006 - 2010

	Rating: To(%)			
From (%)	A+	A	A-	B+
A+	**100.00**	0	0	0
A	10.00	90.00	0	0
A-	0	**33.33**	66.67	0
B+	0	**50.00**	0	50.00

Note: No companies fall into rating grades A++, B++, B and NR5 during the observation period (2006 to 2010). Thus, rows/columns for these rating grades are omitted from the table.

In Table 5.4.5.2, Matrix A depicts rating transitions for general insurers during 2006 to 2010. There are 218 observations derived from 45 companies over a five-year period (as shown in Table 5.4.5.1). A++ and A rated insurers reflect the highest probabilities of remaining in the same rating grades, with a probability score of more than 0.9000. A- insurers have high chances of rating upgrades (prob=0.1887) while A+ insurers are at risk of rating downgrades (prob=0.1379). Insurers in the NR5 category depict positive rating outlook, a total of 0.3636 chances of rating upgrades.

Matrix B shows rating transitions for life insurers during 2006 to 2010. The matrix consists of 34 observations derived from 7 insurers. Even though this is a small sub-sample, the matrix is constructed to highlight significant findings that correspond to this study. The matrix generates outcomes for only three rating grades, A+, A and A-. The trends in Matrix B are almost similar to those in Matrix A. A+ rated life insurers are still facing the risk of downgrades (prob=0.3333), A-rated life insurers remain remarkably strong (prob=1.000) and A- rated life insurers should be looking forward to upgrades (prob=0.2222).

Matrix C presents transition outcomes for composite insurers. There are 30 observations and six insurers in the estimation. There are four rating grades generated from the sub-sample. Surprisingly, A+ rated composite insurers show remarkable performance, with a 1.000 chance of rating unchanged. In addition, A and A- rated composite insurers also depict positive rating outlooks, which indicate rating upgrades in the future (prob=0.1000 for A and prob=0.3333 for A-).

Outcomes from all matrices can be concluded as follows:

i. General insurers depict more rating grade variations during the observation (2006 – 2010). There are six grades generated (A++, A+, A, A-, B++ and NR5). In contrast, there are only three grades to represent life insurers' rating performance and four grades for composite insurers. We assume that the lack

of data primarily causes differences. Our justification is similar to previous studies that dealt with limited data that subsequently restrict the possible outcomes (Hu et al; 2002, Bae et al 2007 and Fuertes and Kalotychou 2007).

ii. The rating variations which are evident in Matrix A can be an indicator that financial performance in the general insurance market is more volatile than the others, as reflected in the rating fluctuations.

iii. Life insurers depict lesser variations in rating grade transitions. This might be attributed to the nature of the life insurance business itself. It is a long term business transaction with a more stable cash flow and performance outlook. Thus, the life insurance business is less volatile compared to general insurance business. It is reflected in the stability of the rating transition over the years which centers on the higher grades (good grades)

As a conclusion, outcomes from these analyses reflect a significant difference in rating performance as influenced by the type of insurance companies. The outcomes correspond to our hypothesis that general and composite insurers are more likely to be rated than life insurers. The outcomes are also in accordance with Kartasheva and Park (2012) where general and composite insurers tend to obtain good rating grades in order to boost company's reputation, reduce cost of capital and signal stronger financial performance.

5.5 RATING TRANSITION ANALYSIS: A COMPARISON OF PRE-FINANCIAL CRISIS AND POST-FINANCIAL CRISIS PERIODS

The focal point of the UK financial crisis or credit crunch which started in mid-2007 has been discussed by many economists (Barrell and Davis 2008; Mizen 2008; Martin and Milas 2009; Busch 2010; Erkens et. al 2010; Vriesendrop and Gramatikov 2010 and Evans 2011). In these papers, the onset of the financial crisis is pinpointed to mid-2007, July 2007 or summer

of 2007. The particular breakpoint is important since it will be the basis our comparison. Hence, referring to the literature, the crisis year date or the break point for the two groups is set as the year 2007.

In a survey conducted by Vriesendrop and Gramatikov (2010), data are divided into two periods, namely the "before" financial crisis period and "after" financial crisis period. All data before 2007 are pooled into the "before" period and data after year 2007 are pooled into the "after" period. A similar approach is evident in Salvador et al (2011) who studied the effect of the financial crisis on rating performance. Their sample is taken from the Spanish banking sector from 2000 to 2009. They focus on the differences in the rating performance, before and after the financial crisis event. Observations from 2000 to 2007 are classified as *before* the crisis and those from 2008 to 2009 are classified as *after* the crisis.

De Mey (2009) conducts a qualitative analysis to investigate the effect of the financial crisis on life insurer's financial reporting standard. He concludes that the crisis has a significant effect on financial reporting frameworks, where life insurers have to modify their frameworks to suit the needs of various stakeholders. In addition, Salvador et al (2011) conclude that the financial crisis has a significant effect on rating performance. However, they use credit ratings assigned to banks. Following the same basis, this study attempts to evaluate the effect of the financial crisis on insurer's rating performance.

This study attempts to have a different take, in terms of the location of study and the population to be observed. The study selects the UK as the location of study and the UK insurance industry as the population. Within the scope of the author's knowledge, this approach has not been attempted in any other studies. Thus, the study aims to investigate the effects of the financial crisis on the rating performance by comparing outcomes from the two specified periods. The original dataset in this study is divided into two distinct categories, which are the pre-financial crisis (Pre-FC) and post-financial crisis (Post-FC) periods. It is decided that data up to the year 2007

(2006 and 2007) are assigned to the pre-FC group and data for the year 2008 to 2010 into the post-FC group.

Table 5.5.1

Descriptive Characteristics of the Data Used in the Comparative Matrices

282 Observations, 2006 to 2010

	Pre-Financial Crisis (Pre-FC) (2006 to 2007), T = 2		Post-Financial Crisis (Post-FC) (2008 to 2010), T = 3	
	N*	n*	N*	n*
General insurers	85	43	133	44
Life insurers	14	7	20	7
Composite insurers	12	6	18	6
Total	111	56	171	57

N* refers to the number of observations over the analysis duration (n* x T)

n* refers to the number of insurers in the dataset

Source: Author's computation

Based on the data in Table 5.5.1, the total number of observations for both periods is 278 observations, which is derived from 57 insurance companies over a five-year period (2006 to 2010). In the Post-FC, the number of insurers by type of business corresponds to the original sample distributions (44 general insurers, seven life insurers and six composite insurers). However, there is a slight variation in figures for the pre-FC period, where there are only 43 instead of 44 general insurers. Thus, the total number of insurers in the pre-FC period is 56, and not 57.

This difference is due to the characteristics of the data itself, which is unbalanced. Dougherty (2006) states that the panel data are described as unbalanced if some observations are missing from the observations. With regard to the data availability constraint, all companies with three- year or more of complete data are included in the sample. This is applicable to all 57 companies in both periods. From the sample, it is detected that there is one general insurer who only has complete data for a three-year period (2008 to 2010). Thus, this insurer will be accounted in the post-FC period but not in the pre-FC period. It is assumed that this is the possible rationale

behind the variation [i.e. 44 -43] in the total number of general insurers. In this comparative analysis, the rating transition matrices (RTM) will be estimated as:

i. Comparative RTM for all insurers

ii. Comparative RTM for general insurers

This study will only be comparing transitions for all insurers and general insurers. Transitions from life and composite insurers will not be attempted due to a small number of observations. Table 5.5.2 illustrates the rating distributions according to the type of business that supports our justification for excluding life and composite insurers from the comparison.

Table 5.5.2

Descriptive Analysis of the Rating Data (2006 -2010).

Rating Data Distribution During the Pre-Financial Crisis (pre-FC) Period According to Type of Business, 2006 - 2007									
Type/Grade	A++	A+	A	A-	B++	B+	B	NR5	Obs.
General	10	16	21	29	2	0	0	7	85
Life	0	8	0	6	0	0	0	0	14
Composite	0	4	4	2	0	2	0	0	12
Total	10	28	25	37	2	2	0	7	**111**

Rating Data Distribution During the Post-Financial Crisis (post-FC) Period According to Type of Business, 2008 -2010									
Type/Grade	A++	A+	A	A-	B++	B+	B	NR5	Obs.
General	12	18	59	35	5	0	0	4	133
Life	0	4	12	4	0	0	0	0	20
Composite	0	8	9	1	0	0	0	0	18
	12	30	80	40	5	0	0	4	**171**

Source: Author's computation

Table 5.5.2 depicts a comparative rating distribution by type of business. There are more observations for general insurers, both in pre-FC (85 obs.) and post-FC periods (133 obs.). The rating distribution for general insurers also shows a wider distribution, encompassing seven grades, with null score in grade B. This variation implies that there is a certain degree of fluctuation on the rating performance among general insurers. The variation shown in Table 5.5.2 conforms to the ABI report (2009) which indicates that the UK

general insurance performance is affected by the financial crisis with a significant decrease in net written premiums. The decrease in the net written premium will substantially affect the financial performance as a whole

In contrast, the number of observations in life and composite insurer is small relative to general insurers. There are only 34 obs. for life insurers in both periods (pre-FC=14, post-FC=20) and 30 obs. for composite insurers (pre-FC=12, post-FC=18).Rating distributions for life and composite insurers are less volatile relative to the general insurers. The rating score is highlighted in the table for ease of observation. It shows a tendency towards the higher rating grades (A+, A and A-), with the distributions clustered around these grades in both periods. It infers that the rating performance of life and composite insurers is less affected by the financial crisis. Thus, it is assumed that life and composite insurers' performance is better than general insurers, as reflected in fewer rating fluctuations and variations in the distribution.

5.5.1 Comparative Rating Transition Analysis: All Insurers

Table 5.5.1.1 depicts the comparative transition analysis for all insurers during the pre-financial crisis (Matrix D) and post-financial crisis periods (Matrix E). The number of observations for each period is specified in the headings, the values in the diagonal are highlighted, and the outstanding result are shown in bold. Notes at the bottom of each matrix are supplied to acknowledge data omission. For example:

"No companies fall into the rating category for grades B+ and B during the observation period (2008 to 2010). Thus, rows/columns for rating grades B+ and B are omitted from the table".

Table 5.5.1.1
Comparative Matrices Based on Two Different Financial Periods
Pre-Financial Crisis (pre-FC) and Post-Financial Crisis (post-FC)

Matrix D, Pre-Financial Crisis
Rating Transition Matrix (%)
All Insurers, 111 Observations, 2006 - 2007

	Rating: To(%)						
From (%)	A++	A+	A	A-	B++	B+	NR5
A++	100.00	0	0	0	0	0	0
A+	0	100.00	0	0	0	0	0
A	0	0	100.00	0	0	0	0
A-	0	0	**10.53**	89.97	0	0	0
B++	0	0	0	**100.00**	0	0	0
B+	0	0	0	0	0	100.00	0
NR5	0	0	**25.00**	0	0	0	75.00

Note: No companies fall into rating grade B during the observation period (2006 to 2007). Thus, rows/columns for rating grade B is omitted from the table.

Matrix E, Post-Financial Crisis
Rating Transition Matrix (%)
All Insurers, 171 Observations, 2008 - 2010

	Rating: To(%)					
From (%)	A++	A+	A	A-	B++	NR5
A++	100.00	0	0	0	0	0
A+	0	68.18	**31.82**	0	0	0
A	0	2.08	97.92	0	0	0
A-	0	0	**27.59**	72.41	0	0
B++	0	0	0	0	100.00	0
NR5	0	0	0	**50.00**	**25.00**	25.00

Note: No companies fall into rating grade B+ and B during the observation period (2008 to 2010). Thus, rows/columns for rating grade B+ and B are omitted from the table.

Source: Author's computation

The full sample in this study contains eight rating grades (A++, A+, A, A-, B++, B+, B and NR5). Instead of full eight rating grades, some of the matrices illustrate partial results. It must be emphasized that all insurers in the sample have equal chances to be included in the analysis. Hence, the omission is not deliberate but is due to the effect of the transition, that is not being observed for a particular rating

grade at the time of estimation. The discussion will include another measurement of rating quality, which is the rating magnitude. Rating magnitude is the degree of change from one letter rating to another. As an example, a rating change from A++ to A+ represents a 1-rating magnitude and a rating change from A to A++ represents a 2-rating magnitude (regardless of an upgrade or a downgrade). It is useful to reflect the extent of the rating transition, irrespective of the movements. It could reflect the magnitude of a rating upgrade or the magnitude of a rating downgrade (Hadad et al 2009)

Matrix D in Table 5.5.5.1 estimates the transitions for seven rating grades. Interestingly, four out of the seven grades reflect higher chance (prob=1.000) of remaining in their current positions. Insurers with A- and NR5 grades have a positive outlook towards rating upgrades. In addition, B++ rated insurers yield a better chance of 1-rating magnitude upgrade. It implies that B++ rated insurers show improvements in their financial condition, thus allowing them to be upgraded.

The NR5 rated insurers show remarkable rating achievement, where they have a 0.2500 chance of being upgraded up to a 5-rating magnitude. NR5 grade is assigned to insurers who have obtained a rating in the past but did not formally maintain the rating assessment (A.M Best 2010). Looking at the probability of the rating upgrade, insurers in the NR5 category have a good chance of obtaining an A grade, which is a secure grade under A.M. Best rating guidelines.

Matrix E represents the transitions that occur after the financial crisis (post-financial crisis). A significant difference is that the rating transitions after the crisis show greater variation or that it is less stable. A++ and B++ remain unwavering at the current grade and the other grades depict fluctuations. A+ rated insurers are at the most vulnerable position, with the largest possibility of downgrade

(prob=0.3182). NR5 rated insurers' scores a total of 0.7500 chance of rating upgrades, up to 4-rating magnitude.

The findings conform to Carty and Fons (1994) that the higher-quality ratings have a higher likelihood of remaining unchanged than the lower-quality ratings. In our study, A++ rated insurers reflect a definite chance of maintaining their current rating grade, irrespective of the periods. A++ rating grade is assigned to insurers that have the superior ability to fulfill their ongoing insurance obligations. In this case, A++ rated insurers manage to maintain their rating performances which imply that their financial performances are not affected by the financial crisis.

Frydman and Schuermann (2008) claim that there is no possible justification for being rated under the NR category, and the grade is not a reflection of good or poor financial performance. This study provides evidence that the NR5 rating grade does not signify poor financial performance. The analysis shows that the NR5 have remarkable chances of rating upgrades, with the best achievement shown at 5-rating magnitude, and this has been proven repeatedly in all durations of analysis. A.M Best (2010) assigns A+ rating grade to insurers that have the superior ability to meet their ongoing insurance obligations. In addition, A+ rating is categorised in the same category as A++ rating grade, which is the "Superior" or the highest grade in A.M Best rating scale. Theoretically, A+ rated insurers should be able to maintain their current rating positions. Surprisingly, our analysis reflects that A+ rated insurers show the highest probability (prob=0.3182) of rating downgrades.

Kisgen (2009) states that rating grades provide information to the market about firm's credit quality. Subsequently, consumers and businesses might react negatively following the downgrade by cutting back on consumption and investment (Màhlmann 2011).A rating downgrade is not a favorable outcome to many insurers. Ultimately, a

rating downgrade influences insurer's reputation in the market. Nevertheless, the significant rating downgrade can be associated with the impact of the financial crisis. O'Brien (2010) mentions that insurers are indeed affected by the financial crisis, leading to the weakening of the financial performance of many insurers and reinsurers. In addition, Baluch et al (2009) highlight that the financial crisis and recession will reduce the demand for general insurance to some extent, leading to drastic cost-cutting measures in order to preserve profitability. The study employs the comparative rating transition matrices in order to answer our second research question: Does rating performance differ from the pre-financial crisis and post-financial crisis periods?

The comparative analysis shows that there is a significant difference in the rating performance before and after the financial crisis. Rating performance depicts a stable outlook before the crisis, as reflected in the definite chances of maintaining the current rating grade. Conversely, rating performance after the crisis shows less stability and more variations. Insurers are susceptible to the risk of rating downgrades, irrespective of their strong financial basis prior to the financial crisis.

5.5.2 Comparative Rating Transition Analysis: General Insurers

The study attempts to illustrate the effect of the financial crisis on general insurers. The total sample for this comparative analysis yields 282 observations. Out of the total observations, 218 observations are derived from general insurers, which dominate the sample. The observations encompass the motivation and justification to investigate the effect of the financial crisis on general insurers.

Table 5.5.2.1
Comparative Matrices Based on Two Different Financial Periods-
Pre-Financial Crisis (pre-FC) and Post-Financial Crisis (post-FC)

Matrix F, Pre-Financial Crisis
Rating Transition Matrix (%)
General Insurers, 85 Observations, 2006 - 2007

	Rating: To(%)					
From (%)	A++	A+	A	A-	B++	NR5
A++	100.00	0	0	0	0	0
A+	0	100.00	0	0	0	0
A	0	0	100.00	0	0	0
A-	0	0	**13.33**	86.67	0	0
B++	0	0	0	**100.00**	0	0
NR5	0	0	**25.00**	0	0	75.00

Note: No companies fall into the rating category for grades B+ and B during the observation period (2006 to 2007). Thus, rows/columns for rating grades B+ and B are omitted from the table

Matrix G, Post-Financial Crisis
Rating Transition Matrix (%)
General Insurers, 133 Observations, 2008 - 2010

	Rating: To(%)					
From (%)	A++	A+	A	A-	B++	NR5
A++	100.00	0	0	0	0	0
A+	0	**76.92**	**23.08**	0	0	0
A	0	0	100.00	0	0	0
A-	0	0	**25.00**	75.00	0	0
B++	0	0	0	0	100.00	0
NR5	0	0	0	**50.00**	**25.00**	25.00

Note: No companies fall into the rating category for grades B+ and B during the observation period (2008 to 2010). Thus, rows/columns for rating grades B+ and B are omitted from the table.

Source: Author's computation

Table 5.5.2.1 depicts the rating transition matrices for general insurers for both pre-FC (Matrix F) and post-FC (Matrix G) periods. A general observation highlights that there are only six rating grades involved in the transitions (A++, A+, A, A-, B++ and NR5). The rating grades tend to reflect insurers in the secure financial positions (secure grades are from B+ to A++). Thus, a general assumption is

that all insurers in the estimation have good financial performance, that they can fulfill their insurance obligations, as reflected in the secure grades.

Matrix F illustrates the rating performance in the pre-FC period. It is apparent that insurers with higher rating grades (A++, A+ and A) show definite chances of maintaining their current rating grades (prob=1.000). In addition, B++ rated insurers also reflect a strong, positive outlook of definite rating upgrade. Observations on all grades show the tendency towards rating upgrades, and no risk of rating downgrades. However, previous studies discuss that ratings are slow to react to changes, and that rating changes are better reflected in the long-run (Loffler 2005, Ekins et al 2012 and Gu et al 2014). The sample in the pre-FC considers rating data over the period of two years, 2006 to 2007. Thus, a two-year time horizon can be deemed a short period of observation – characterised by stable and less extreme rating changes.

On a different perspective, Matrix G depicts general insurers' rating performance in the post-financial crisis period. Since the attempt is to detect differences, the outcomes from the matrix have realised this intention. A++ and A rated insurers have proven to remain persistent in their position, showing no variation in both periods. B++ rated insurers also have a higher chance of maintaining their current rating grade. However, they reflected a better rating performance in the pre-FC period, where they have a probability of 1.000 to be upgraded to 1-rating magnitude.

Interestingly, general insurers that have been assigned A+ rating grade are clearly susceptible to rating downgrades. Their transition scores 0.2308 chance of a downgrade up to 1-rating magnitude. In this case, A+ rated general insurers will experience rating downgrade to the next rating class, which is A. Even though the magnitude of

change is not large, the impact of a rating downgrade could damage the company's reputation and trigger adverse market reactions, as evident in prior studies by Steiner and Heinke (2001) and Eckles and Halek (2012).

5.5.3 Comparative Rating Transition Analysis: General Conclusions

By looking at the previous matrices, it is evident that rating movements during the pre-financial crisis period are less chaotic compared to the post-financial crisis period. Most insurers in the sample have a high probability of maintaining their current rating grade (as reflected in matrices with prob=1.0000). This is indeed a very stable outlook throughout the pre-FC period. The finding corresponds to the previous work of Ekins and Calabria (2012), that ratings are relatively stable in the short-run since rating agencies do not impart new information on a frequent basis. Subsequently, rating assessment is costly and voluntarily. Thus, frequent rating assessment entails cost that could potentially raise the cost of financial instruments (i.e. the price of insurance).

However, matrices in the post-financial crisis period reflect more chaotic movements. The fluctuation in rating trends in the post-financial crisis period is evidence which supports the objective. There is a significant difference in the rating performance after the financial crisis. Similar fluctuation trends are observed for all insurers and general insurers. The similar findings in Matrix E (All insurers, post-FC) and Matrix G (General insurers, post-FC) could be due to the data in the sample being heavily dominated by general insurers (218 observations from general insurers, approximately 77% out of total observations). Thus, general insurers' rating performance influences the overall performance.

Another noteworthy discussion relates to the deteriorating rating performance of A+ rated insurers, as reflected in the transition matrices. Despite being assigned with secure grades, general insurers have higher degree of rating downgrades. In contrast, there are several extreme cases like an NR5 (not formally followed category) insurers being upgraded up to A- or even A rating grade. Since the rating process in voluntary (Pottier and Sommer 1999), the absence of a proper rating grade does not imply that these companies are experiencing financial vulnerabilities. There could be several possible explanations for this. Firstly, the fees are unaffordable. Secondly, the company does not need an annual-based rating process but only seeks a rating to comply with a particular regulatory requirement. Thirdly, the company is simply not motivated to obtain a rating. All explanations do not signify weaker financial performance.

Direct comparisons might be unfair due to different time-lengths (2-year and 3-year) and the number of observations. However, one general observation during the pre-financial crisis period is that there is less variation in rating activities and a higher probability of remaining in the current rating position in the short-run. This trend is similar to other studies; ratings are slow to react to changes (Bottini 1993, Altman and Rijken 2004, Löffler 2005 and Ekins and Calabria 2012). On the other hand, the effect of the financial crisis is illustrated in the post-financial crisis rating performance. There are more fluctuations in the rating activities and less stability. Insurers become more vulnerable towards rating shift, and a negative outlook (downgrade) could project a distress signal about their financial condition. The trend corresponds to other claims (Schich 2009 and Harrington 2009) that the financial crisis does affect insurer's financial performance, and changes in the rating grades reflect the effect.

The comparative analyses are conducted to investigate the difference in the rating performance between pre-financial crisis and post-

financial crisis. Thus, it could be said that the objectives have been achieved through the comparison drawn - significant differences in rating performance are observed in both periods.

5.6 REGRESSION ANALYSIS

This study also performs regression analysis in order to investigate the key financial determinants associated with the financial strength rating (FSR). The aim is to determine the financial determinants which have a greater influence on FSR as shown in the rating transitions. From the rating analysis, it is concluded that:

i. There is a higher probability of a rating change, which concentrates on rating upgrades.
ii. General insurers are more likely to be rated than life insurers.
iii. Rating performance differs between the pre-FC period and post-FC period.

The regression analysis will be performed to answer these research questions:

i. Which financial determinants have the greater influence on the FSR rating?
ii. Does FSR performance differ between the pre-FC period and post-FC period?

Subsequently, the regression analysis will be performed in order to test the following hypotheses:

H1: Insurers with lower leverages will have a higher probability of obtaining a higher rating grade.
H2: Insurers with higher profits will have a higher probability of obtaining a higher rating grade.
H3: Insurers with higher liquidity will have a higher probability of obtaining a higher rating grade.
H4: Larger insurers will have a higher probability of obtaining a higher rating grade.

H5: Insurers with higher amount of reinsurance held will have a higher probability of obtaining a higher rating grade.

H6: Insurers with greater growth in annual surplus will have a higher probability of obtaining a higher rating grade.

H7: General and composite insurers are more likely to be rated than life insurers.

H8: Stock insurers are more likely to be assigned a higher rating grade than mutual insurers.

5.6.1 Summary of Data Used in Regression Model

The same sample set that has been used in the rating transition analysis will be used in this regression analysis. The original sample consists of 57 insurers that are further reduced to 49 insurers. The reduction is mainly due to limited data availability where at the time of the data compilation, financial data for the year 2010 were mostly not available. Hence, the sample size is reduced and the time horizon, i.e., from 2006 to 2009. Altogether, the dataset comprises of 190 observations over the four-year period. For this analysis, Stata SE 12.0 and SPSS v.19 are used. The data are summarised in Table 5.6.1.1.

Table 5.6.1.1 summarises the type of company, its organisational forms and rating grades obtained by insurers during the period of our study. Based on figures in the table, there are 49 companies that produce 190 observations over the 4-year period. According to the business type, general insurers are the majority while there are only three composite insurers. Insurers are also clustered according to their organisational form. Almost all insurers in the sample are stock companies/insurers except two which are mutual insurers.

Table 5.6.1.1

Summary Data for Sample

	2006	2007	2008	2009	Total
Business Type:					
General	39	39	39	35	**152**
Life	7	7	7	5	**26**
Composite insurer	3	3	3	3	**12**
	49	**49**	**49**	**43**	**190**
Organisational Form:					
Stock insurer	47	47	47	41	**182**
Mutual insurer	2	2	2	2	**8**
	49	**49**	**49**	**43**	**190**
Rating Obtained:					
(5) A++ (Superior)	5	5	4	4	**18**
(4) A+ (Superior)	13	13	13	7	**46**
(3) A (Excellent)	11	13	17	22	**63**
(2) A- (Excellent)	14	12	11	9	**46**
(1) B++, B+(Very	2	3	1	0	**6**
(0) B or lower	4	3	3	1	**11**
	49	**49**	**49**	**43**	**190**

Source: Author's computation

The third part of Table 5.6.1.1 refers to rating grades obtained over the years for all insurers. In terms of its frequency, most insurers are rated as A, followed by A+ and A-. Rating grade A++ is classified as superior grade and as seen in Table A, not many insurers in the sample are assigned with this rating grade. On the other extreme, there are also cases of insurers falling into the lower rating grades (B and lower). However, the number of observations in this category is relatively small if compared with the other rating grades.

In the regression analysis, the rating grades are converted into numerical values. The numerical values assigned to each rating grade are shown in parentheses. Higher numerical values indicate higher rating grades. The conversion follows approaches that have been adopted by Becker and Kennedy (1992) and Katchova (2013).

5.6.2 Descriptive analysis

The analysis begins by providing a descriptive analysis for the data set. Table 5.6.2.1 provides a summary of insurance companies according to their annual assigned rating grades. Companies are segregated according to their business type in order to provide a more detailed overview of the companies in the sample. There are 49 insurers in the sample and a total of 190 observations.

Table 5.6.2.1

Summary of Annually-assigned Rating Grades by Type of Insurers

Business	Rating	2006	2007	2008	2009	Total
General	A++	5	5	4	4	**18**
	A+	7	7	7	4	**25**
	A	10	12	14	18	**54**
	A-	12	10	10	8	**40**
	B++, B+	1	2	1	0	**4**
	B, NR5	4	3	3	1	**11**
	Total	**39**	**39**	**39**	**35**	**152**
Life	A+	4	4	4	0	**12**
	A	1	1	2	4	**8**
	A-	2	2	1	1	**6**
	Total	**7**	**7**	**7**	**5**	**26**
Composite	A+	2	2	2	3	**9**
	A	0	0	1	0	**1**
	B++, B+	1	1	0	0	**2**
	Total	**3**	**3**	**3**	**3**	**12**

Source: Author's computation

As in Table 5.6.2.1, the sample is dominated by general insurers with 35 or more companies each year. The variation in rating grades is also more noticeable for general insurers than for the others. These variations are reflected in the table by a wider spread in rating grades for various years. For example, the general insurer sample consists of insurers rated in eight rating grades – from the best to a vulnerable as well as not rated. On the contrary, there are less than ten life insurers per year in the data set but all are graded A- and above. Conversely, the rating grade variations among life insurers are less

apparent, with concentrations on the higher rating grades (A+, A and A-).

5.6.3 Summary Statistics of Variables Used in the Regression Analysis

Table 5.6.3.1 defines all the variables used in the regression analysis. Altogether, there are eight explanatory (independent) variables (IV) used in this research. The dependent variable, which is RATING, is an ordinal variable. The rating grades are converted into numerical scales, where higher numerical values indicate better rating grades.

Table 5.6.3.1

Variables Used in the Estimation

Variable(s)		Measured by:	Expected
Dependent Variable:			
RATING	Ordinal DV	Ordinal variable categorised into the following:	
	(FSR)	0 = if the firm is assigned a Best rating	
		1 = if the rating is B++ or B+	
		2 = if the rating is A-	
		3 = if the rating is A	
		4 = if the rating is A+	
		5 = if the rating is A++	
Explanatory Variables:			
LEV	Leverage	Accumulated reserve divided by total	**-**
PROFIT	Profitability	Net underwriting expenses and losses divided by net premium earned	**+**
LIQUID	Liquidity	Current assets divided by current	**+**
LNSIZE	Size	Natural log of gross premium written	**+**
REINS	Reinsurance	Annual reinsurance ceded divided by net premiums written	**+**
GROWTH	Growth	Change in surplus	**+**
TYPE	Business Type	Dummy variable 0 = general (non-life) insurer; 1=life	**+/-**
FORM	Organisational	Dummy variable 0 = stock; 1 = mutual insurer	**+/-**
ε_{it}	Error Term		

Source: Author's compilation based on the empirical literature

Table 5.6.3.2 illustrates the means, standard deviations, skewness and kurtosis of the variables. The skewness value provides an indication of the symmetry of the distribution while the kurtosis value deals with the "peakedness" of the distribution (Pallant 2007, p.56). A perfectly normal distribution would yield a skewness and kurtosis value of 0. However, according to Pallant (2007), this is rather an uncommon occurrence in the social sciences.

Table 5.6.3.2

Summary Statistics of the Variables Used in the Regression Analysis (2006 – 2009)

	Obs.	Mean	Std. Dev.	Prob. (Skewness)	Prob. (Kurtosis)	----------Joint----------	
		Stat.	Stat.	Stat.	Stat.	Adj. chi2(2)	Prob>chi2
Leverage	190	0.5273	0.22756	0.0840	0.6790	3.20	0.2024
Profitability	190	0.6107	2.19490	**0.0000**	**0.0000**	-	0.0000
Liquidity	190	29.3601	89.84503	**0.0000**	**0.0000**	-	0.0000
Size	190	12.4001	1.73384	0.0147	0.7246	5.91	0.0521
Reinsurance	190	1.7855	8.64985	**0.0000**	**0.0000**	-	0.0000
Growth	190	10.2004	22.70227	**0.0000**	**0.0000**	70.70	0.0000
Form	190	0.04	0.201	**0.0000**	**0.0000**	61.50	0.0000

Source: Author's computation.

Based on the statistical values in Table 5.6.3.2, all variables except leverage and size, have yielded skewness and kurtosis values of 0.0000, which indicate perfectly normal distributions. However, other relevant tests of normality will be attempted in order to support the assumptions, based on these skewness and kurtosis values.

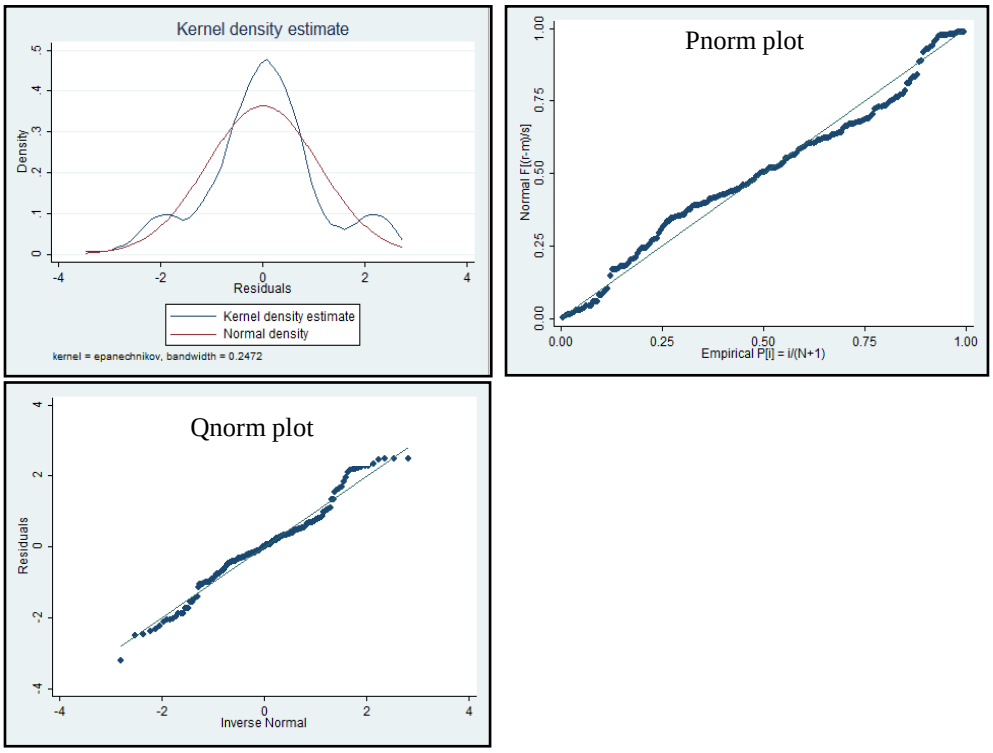
5.6.4 Normality Tests for Model's Residuals

In this study, the normality tests of model's residuals are also attempted. Following any modeling procedure, the validity of the model should be assessed. Residuals and diagnostic statistics allow the researcher to identify patterns that are either poorly fit by the model, have a strong influence upon the estimated parameters, or

which have a high leverage. It is helpful to interpret these diagnostics jointly to understand any potential problems with the model. Normality tests for model's residuals can be done either graphically or numerically. The former include drawing a kernel-density plot (kdensity), standardized normal probability plot (pnorm) and quantiles of variables against the normal distribution plot (qnorm). The latter involve the computation of Shapiro-Wilk, Shapiro-Francia and Skewness/Kurtosis tests. Both graphical and numerical tests will be conducted in order to evaluate the normality of the model's residuals.

Figure 5.6.4.1

Kernel-Density, pnorm and qnorm plot on Model's Residuals



Source: Author's computation using Stata SE v.12

The kernel-density graph, pnorm and qnorm plot are shown in Figure 5.6.4.1. Looking at the kernel density plot, it could be concluded that the residuals distribution estimates do not exactly follow the normal distribution line. The same pattern is depicted in the pnorm plot. The pnorm plot is more sensitive to non-normality at both ends of the data. In addition, the qnorm plot also shows slight deviation from normal at

the lower and upper tail, as can also be seen in the kernel density plot.

Table 5.6.4.1

Summary of Normality Test for Model's Residuals

Shapiro-Wilk Test					
Variable	Obs.	W	V	z	Prob>z
r (for residuals)	190	0.9742	3.677	2.988	0.0014
Shapiro-Francia Test					
Variable	Obs.	W'	V'	z	Prob>z
r	190	0.9752	3.861	2.784	0.0027
Skewness/Kurtosis Test					
				----------joint----------	
Variable	Obs.	Pr(skewness)	Pr(kurtosis)	adj. chi2(2)	Prob>chi2
r	190	0.9351	0.2403	1.40	0.4963
**the chosen alpha level (p-critical) is 0.05					

Source: Author's computation.

In order to further support the argument, normality tests for model's residuals are also conducted by using the Shapiro-Wilk, Shapiro-Francia and Skewness/Kurtosis tests. The outcomes of the tests are summarized in Table 5.6.4.1.

The Shapiro-Wilk test yields a p-value of 0.0014 (W-value is 0.9742), while the Shapiro-Francia test yields a p-value of 0.0027. The null hypothesis (H_0) for this test is that the data are normally distributed. The prob<z listed in the output is the p-value. If the p-value is less than the chosen alpha level (0.05), then the null hypothesis that the data are normally distributed is rejected. If the p-value is greater than 0.05, then the null hypothesis is not rejected. In this case, both p-values generated by the Shapiro-Wilk and Shapiro-Francia tests are less than the alpha level, thus the H_0 is rejected.

With regards to these values, it could be concluded that model's residuals for this sample does not come from a normal distribution. An additional issue with the Shapiro-Wilk's test is that the larger size

of data increases the chances of rejecting the null hypothesis. Additionally, for large amounts of data even very small deviations from normality can be detected, leading to rejection of the null hypothesis event though for practical purposes the data is more than normal enough (Hiemstra 2013).

5.6.5 Test of Multicollinearity

The study computes the correlation coefficients for all independent variables (IV) included in the model. The tests are performed to check for multicollinearity problem. Multicollinearity problem could exist when there are more than two IVs used in the model. It could also be caused by improper use of dummy variables. The regression model includes eight IVs that incorporate two dummy variables to represent the type of business and organizational form. Thus, several tests are performed to address this issue. Table 5.6.5.1 depicts a matrix of Pearson Spearman correlation coefficients, together with the Variance Inflation Factor (VIF) and Tolerance Factors (1/VIF).

Table 5.6.5.1

Correlation-Coefficient, VIF and 1/VIF

	VIFs	*1/VIF*	*RATING*	*LEV*	*PROFIT*	*LIQUID*	*LNSIZ*	*REINS*	*GROWTH*	*TYPE*	*FORM*
RATING			1.000								
LEV	1.64	0.609	0.208	1.000							
PROFIT	1.57	0.638	0.045	-0.118	1.000						
LIQUID	1.27	0.786	0.169	0.206	0.042	1.000					
LNSIZE	1.12	0.894	0.360	0.313	-0.279	-0.058	1.000				
REINS	1.10	0.913	-0.012	-0.122	0.036	-0.051	0.016	1.000			
GROWT	1.02	0.979	-0.038	0.040	-0.009	-0.061	-0.026	-0.023	1.000		
TYPE	1.02	0.980	0.139	0.554	0.016	-0.009	0.320	-0.062	0.050	1.000	
FORM	1.01	0.988	-0.163	-0.062	-0.006	-0.054	-0.093	0.018	-0.037	-	1.000

Source: Author's computation

Based on the output in Table 5.6.5.1, observation shows that all variables except REINS, GROWTH and FORM have positive correlations with RATING. Correlation coefficients seem to be below 0.70 which indicates the absence of multicollinearity. Low VIF values also reflect this. Thus, it can be concluded that multicollinearity is

unlikely to be a problem for these variables. This assumption is also supported by the VIF and Tolerance factors where the calculated VIFs are all less than 1.70 and tolerances are more than 0.600. These values correspond to the cut-off points for determining the existence of multicollinearity, where the VIF value higher than 10.00 or tolerance value less than 0.100 (Pallant 2007, p.156) indicates multicollinearity.

5.6.6 Test of Heteroscedasticity.

Several diagnostic tests are also employed in order to test for heteroscedasticity. Heteroscedasticity can be caused by subpopulation differences or other interaction effects. It could also occur due to the violation of assumptions or model misspecification. However, assuming that other assumptions have been met except heteroscedasticy, then this problem will not affect the parameter estimates in the regression.

This study uses Breusch-Pagan (Cook-Weisberg) test and White's General test to address heteroscedasticity in our sample. Table 5.6.6.1 depicts the results from several tests. All tests are performed to observe heteroscedascity in the model. William (2009) provides a guideline on how to interpret the results above. He shows that heteroscedasticity is reflected by the test statistics. Heteroscedasticity is observed when the test statistic shows a significant value. Based on the p-value scores in all tests, heteroscedasticity is observed in the model.

Berry and Feldman (2000) suggest several alternatives to treat heteroscedasticity problem. First of all, analysts can re-specify the model or transform variables, assuming that there is an omission of important variables. Secondly, analysts can employ robust standard error calculations to solve the issue and to generate more consistent results.Robust standard error does not change the coefficient

estimates, but it will change the standard error and t-value. If heteroscedasticity is present, larger variation will be observed. In the regression analysis, it will employ the robust standard error computation in order to treat the heteroscedasticity problem.

Table 5.6.6.1

Summary of All Heteroscedasticity Tests

Breusch-Pagan / Cook Weisberg Test for Heteroscedasticity			
Ho = Constant variance			
Variables = Fitted value of RATING			
Chi2(1) = 11.54			
Prob> Chi2 = 0.007 ***			
White's General (IM) test for Heteroscedasticity			
White's Test for H_o : homocedastic			
against H_a : unrestricted heteroscedasticity			
Chi2(34) = 61.55			
Prob> Chi2 = 0.0026 ***			
Cameron &Trivedi's Decomposition of IM-Test			
Source	Chi2	df	p.value
Heteroscedasticity	61.55	34	0.0026 ***
Skewness	9.36	7	0.2281
Kurtosis	2.31	1	0.1281
Total	73.22	42	0.0020 ***
*** sig. at the 1% level	** sig. at the 5% level*Sig. the 10% level		

Source: Author's computation.

5.6.7 Ordered Probit Regression Models (OPM)

The ordered probit regression model (OPM) is employed as an estimation method in this study. The decision to use the OPM is based on the characteristic on the dependent variable, which is RATING. The dependent variable is derived from the numerical conversion of the A.M Best rating. Thus, the dependent variable is an ordinal variable, with more than two categories.

Based on previous studies, ordinal variables are best estimated using OPM models (Gaver and Pottier 2005, Grunert et al 2005, Florez-Lopez 2007 and Kartasheva and Park 2012). The study estimates several different models to identify significant differences in the outcomes. The models are:

i. OPM for all insurers (Model 1 – Table 5.6.7.1).
ii. OPM for all insurer – Alternatives (Model 2 – Table 5.6.7.2)
iii. OPM by type of insurers (Model 3 – Table 5.6.7.3)
iv. OPM by periods of financial crisis (Model 4 – Table 5.6.7.4).

In order to reflect the effect of using robust standard error, the study will provide comparative estimation results. The OPM for all insurers (Model 1) will be estimated using standard error and robust standard error. It is predicted that there will be variations in the outcomes, especially the t-values. The variable "size" in Model 1 is measured using the natural logarithm of gross premium written, as suggested by Van Gestel et al (2007) which they deemed appropriate to reflect the size of an insurance company. The analysis is extended to incorporate the effect of using cluster robust standard error estimation.

On the other hand, Model 2 will be estimated using an alternative approaches to measure size, growth and organizational form. In this instance, size is measured by using the natural logarithm of the total assets. This measurement has been widely used in measuring size for banks and other financial institutions (Malik 2011, Ismail 2012 and Burca and Batrinca 2014). Growth will be measured by using the changes in total assets (Weiss 1998 and Hardwick and Adams 1999). Subsequently, organizational form will be changed in order to evaluate the effect when insurers become publicly-traded companies (i.e an insurer is quoted on the stock market). Form is a dummy variable, thus it will be adjusted accordingly (0 = publicly-traded company and 1 = privately-traded company). Model 2 is estimated as a comparative study, to establish whether there is a significant

difference in the estimation by using different sets of variables' measurement.

Model 3 is an extension of the first model, by narrowing down the scope of investigation based on type of insurance companies. There are three categories of insurers in the dataset – general, life and composite insurers. Individual estimations based on these types are attempted in order to identify any significant differences in rating performance among general, life and composite insurers. Subsequently, Model 3 will also identify what are the key financial determinants that affect rating performance for each and every insurer.

Model 4 is attempted to identify differences in the financial strength rating performance between two particular periods, the pre-financial crisis and the post-financial crisis periods. Subsequently, the hypotheses will be tested against the findings derived from the regression analysis.

Results in Table 5.6.7.1 shows that the computation of the robust standard error produces differences in both the standard error and statistical value (p-value denoted in parentheses). Allison (1995) highlights that robust standard error can be used to treat heteroscedasticity and it will also generate more consistent results.

As in Williams (2009), robust standard error does not change the coefficient estimates but it changes the t-value. Evidence can be seen in the analysis, as the pseudo R2 values for both models did not change at all. The validity of the model is proven by the Prob>chi(2) values, which is 0.000. In addition, cluster robust standard error estimation is also attempted in order to obtain more variations and possible improvements with the regression results.

Table 5.6.7.1
Regression Result for Model 1
All insurers, 190 observations, 2006 -2009

Panel A: The Estimation Result

Variable	Regression 1 (OPM)			Regression 2 (Robust)			Regression 3 (Cluster Robust)		
RATING	Coeff.	Sig.	Std. Err.	Coeff.	Sig.	Robust SE.	Coeff.	Sig.	Cluster SE.
LEV	.4341 [.326]		.4416	.4341 [.359]		.4731	.4341 [.580]		.7846
PROFIT	.0780 [.033]	**	.0366	.0780 [.000]	***	.0179	.0780 [.004]	***	.0269
LIQUID	.0022 [.015]	**	.0010	.0022 [.074]	*	.0013	.0022 [.261]		.0020
LNSIZE	.2396 [.000]	***	.0511	.2396 [.000]	***	.0589	.2396 [.025]	**	.1070
REINS	-.0014 [.884]		.0088	-.0014 [.835]		.0062	-.0014 [.782]		.0046
GROWTH	-.0015 [.634]		.0034	-.0015 [.530]		.0026	-.0015 [.573]		.0028
TYPE	.1510 [.577]		.2707	.1510 [.483]		.2153	.1510 [.664]		.3472
FORM	-.8030 [.038]	**	.3867	-.8030 [.000]	***	.1298	-.8030 [.000]	***	.2161
	LR Chi2(8)		41.13	Wald Chi2(8)		123.78	Wald Chi2(8)		59.09
	PseudoR2		0.0698	PseudoR2		0.0698	Pseudo R2		0.0698
	Prob>chi(2)		0.0000	Prob>chi(2)		0.0000	Prob>chi(2)		0.0000
Panel B: Marginal Effects									
LEV	-.0341 [.344]			-.0341 [.387]			-.0341 [.066]		
PROFIT	-.0061 [.060]	*		-.0061 [.004]	***		-.0061 [.004]	*	
LIQUID	-.0020 [.041]	**		-.0020 [.087]	*		-.0020 [.001]		
LNSIZE	-.0189 [.002]	***		-.0189 [.004]	***		-.0189 [.012]	**	
REINS	.0001 [.884]			.0001 [.835]			.0001 [.001]		
GROWTH	.0001 [.636]			.0001 [.529]			.0001 [.001]		
TYPE	.0119 [.583]			.0119 [.489]			.0119 [.034]		
FORM	.0631 [.036]	*		.0631 [.068]	***		.0631 [.043]	***	
Panel C: Predictive Probability (Marginal Effect) on variable "FORM"									
FORM:									
0 (Stock)	.3411 [.007]	***		.3411 [.003]	***		N/A		
1(Mutual)	.4721 [.095]	*		.4721 [.041]	**		N/A		
*** sig. at the 1% level				**sig. at the 5% level			* sig. at the 10% level		

Source: Author's estimation using Stata SE v.12

Cameron and Miller (2011) suggest that since the panel data has repeated observations on the individuals, it could be clustered according to the individuals (in this data set, individuals refer to insurance companies). The clustered robust estimation has been

attempted by many scholars, Liang and Zeger (1986) and Arellano (1987) on grouped data, where the clustering is on the individuals. However, Moulton (1990), Pepper (2002) and Bertrand et al (2004) argue that there is no universal guideline to specify the clusters. Thus, based on the data, it is decided that the cluster robust standard error estimation will be attempted by clustering it according to the individuals (insurance company).

Panel A in Table 5.6.7.1 shows that profitability, liquidity, company size and organizational form are positively related to rating. Similar findings are evident from the first two models. However, the significance level differs. The estimation with robust standard error produces more consistent results with a stronger association with the dependent variables.

From Regression 2 – profitability, size and organizational form are positively and statistically significant with the p-value of 0.0000. In addition, liquidity also has a positive influence on rating, but at a lower significant value, at 10%. Assuming that the rest of the variables remain constant, the findings conform to the hypotheses as follows:

H2: Insurers with higher profits will have a higher probability of obtaining a higher rating grade.

The finding shows that profitability is a statistically significant (p-value 0.000, sig. at 1%) factor that influence the dependent variable. Thus, H_0 is rejected and it is established that profitability is a key determinant in influencing the rating grades. This finding corresponds to the previous study by Adams et al (2003).

H3: Insurers with higher liquidity will have a higher probability of obtaining a higher rating grade.

Liquidity is positively associated with ratings (p-value 0.074, sig. at 10%). This is in line with other studies (Almajali 2012 and Omondi and Muturi 2013). Insurers that have higher liquidity base will be able to fulfill their financial obligations to policyholders, thus depicting good financial performance.

H4: Larger insurers will have a higher probability of obtaining a higher rating grade.

Previous studies defined company size based on the total assets. However, this study differs slightly by measuring it against its gross premium written as in Van Gestel (2007). Interestingly, evidence from the regression is able to support the hypothesis – there is a statistically significant association between company size and rating grades (p-value 0.000, sig. at 1%). In this instance, it is concluded that gross premium written can be used to measure company size.

H8: Stock insurers are more likely to be assigned higher rating grade than the mutual insurers.

Again, the study embarks on a different approach by following Kartasheva and Park (2012). Instead of mutual insurers, the study hypothesized that stock insurers are more likely to be assigned higher rating. However, the finding shows a negative linkage between organisational form and rating grade (p-value 0.000, sig. at 1%). Thus, the finding contradicts the hypothesis. The sample shows that mutual insurers are more likely to be assigned higher rating grades than stock insurers.

On the other hand, leverage, reinsurance, growth and business type depict a statistically insignificant association with rating. It is inferred that these variables might not be the key factors that affect rating performance. Subsequently, findings from this analysis provide answer to the research question on the financial determinants that influence rating. It is determined that profitability, liquidity, company size and organisational forms are the key determinants that influence rating grades assigned to insurers.

Regression 3 (Clustered Robust SE) shows a slight variation to the other models in terms of its standard error estimation values and significant outcomes. In cluster robust estimation, profitability, size and organizational form remains as significant predictors of rating performance. Outputs in Regression 3 reflect similar point estimates as in the other models, but the standard errors are different. Clustered Robust SE serves to increase the confidence intervals since it allows for correlation between observations. Hence, the higher the clustering level, the larger the resulting SE and outputs become less significant.

Panel B in Table 5.6.7.1 addresses the marginal effects issue. Marginal effects show the change in explained or dependent variable when the predictor or independent variable increases by one unit (Torres-Reyna 2014). All values in parentheses referred to the robust standard error values. The marginal effects (from the robust estimation) of all the significant variables that influence rating grade performance could be summarized as follow. Assuming that other variables remain constant:

i. One unit decrease in profitability will significantly decrease the probability of obtaining a higher rating grade by 6.1%.
ii. One unit decrease in liquidity will significantly decrease the probability of obtaining a higher rating grade by 0.2%.

iii. One unit decrease in size of the company will significantly decrease the chance of obtaining a higher rating grade by 1.89%.
iv. One unit increase in organizational form will significantly increase the chance of obtaining a higher rating grade by 6.31%.

The marginal effects clearly show that profitability, liquidity and company size as the key determinants that affect rating performance. On the other hand, organizational form also matters. However, organizational form is a dummy variable. Thus, one unit increase (changes) in organizational form reflects the difference between being a stock insurer and a mutual insurer (the values for the dummy variable is 0 = stock insurer and 1 = mutual insurer).

Variable “FORM” in the estimation is a dummy variable. It is created to reflect whether the insurance company is a stock insurer (dummy value = 0) or a mutual insurer (dummy value = 1). These dummy values are categorical variable and it should be included in the model as series of indicator variables. It could be further tested by computing the predictive probability of rating performance at each organisational form, holding all other variables in the models at their means. The predictive probability of this variable is shown in Panel C (Table 5.6.7.1).

Based on the results (Panel C), the predicted probability of obtaining higher rating grade is approximately 0.03 for stock insurers and 0.15 for mutual insurers. Both forms show statistically significant influential factors of rating performance (sig. at 1%). This could further support the arguments in the empirical assumption that there is no definite association between organizational form and rating performance (Pottier and Sommer 1997, Van Gestel et al 2007 and Kartasheva and Park 2012). In this instance, organizational form is one of the key determinants that influence rating performance.

Table 5.6.7.2
Regression Results for Model 2 (Alternatives)
All insurers, 190 observations, 2006 -2009

Panel A: The Estimation Results									
	Regression A Alternative to **SIZE**			Regression B Alternative to **GROWTH**			Regression C Alternative to **FORM**		
RATING	Coefficient		Sig.	Coefficient		Sig.	Coefficient		Sig.
LEV	.9090	[.469]	*	.4225	[.474]		.4195	[.462]	
PROFIT	.0326	[.016]	**	.0780	[.018]	***	.0780	[.019]	***
LIQUID	.0016	[.001]		.0023	[.001]	*	.0024	[.001]	*
LNSIZE#	.0201	[.041]		.2385	[.060]	***	.2430	[.058]	***
REINS	.0010	[.008]		-.0012	[.006]		-.0015	[.006]	
GROWTH#	.0022	[.003]		-.0005	[.010]		-.0012	[.003]	
TYPE	.1939	[.226]		-.1375	[.217]		-.1164	[.208]	
FORM#	.9436	[.145]	***	-.7938	[.127]	***	-.0381	[.239]	
No. of Obs.	190			190			190		
WaldChi2(8)	109.58			127.64			29.61		
Prob>Chi2	0.0000			0.0000			0.0002		
Pseudo R2	0.0325			0.0696			0.0625		
Panel B: Marginal Effects									
LEV	-.0926	[.059]		-.0333	[.040]		-.0339	[.040]	
PROFIT	-.0033	[.002]	**	-.0061	[.002]	***	-.0063	[.002]	***
LIQUID	-.0002	[.001]		-.0002	[.001]	*	-.0002	[.001]	*
LNSIZE#	-.0021	[.004]		-.0188	[.007]	***	-.0197	[.006]	**
REINS	.0001	[.001]		.0001	[.001]		.0001	[.001]	
GROWTH#	.0002	[.001]		.0001	[.001]		.0001	[.001]	
TYPE	.0198	[.024]		.0108	[.017]		.0102	[.020]	
FORM#	.0961	[.016]	***	.0625	[.014]	***	.0031	[.020]	
*** sig. at the 1% level			**sig. at the 5% level			* sig. at the 10% level			

Source: Author's estimation using Stata SE v.12

Table 5.6.7.2 provides alternatives to variables size, growth and organizational form. Regression A depicts the estimation output using a different approach to measure company size. In Regression A, instead of using the gross premium written, company size is measured using the total assets. Based on the output, variables leverage, profit and form are the key financial determinants that influence rating performance of an insurer. However, comparing the variable "size" with the estimation output in Model 1 (coefficient = 0.2405, sig. at 1%), the outcome for variable "size" in this regression becomes insignificant. Thus, it could be assumed that due to the operating and accounting differences of insurance companies, using

total assets to measure its size might not be a feasible approach. This could further support author's decision to measure size of an insurer based on its gross written premium. The finding also provide evidence to support the idea by Van Gestel et al (2007) who claim that size is an important rating determinant and its measure should appropriately be reflective on the company operations. In this instance, insurance companies' operations are different than banks and other financial institution. Thus, the appropriate measure of size should be the gross premium written.

Regression B shows the output by using a different approach to evaluate growth. In this instance, instead of using changes in surplus, growth is measured by using the changes in total assets. Weiss (1998) claims that changes in total assets could be used to measure growth. The output shows that, even though the measurement has been changed, growth is still an insignificant determinant of rating performance. A similar result is obtained from the regression in Model 1. Thus, it could be concluded that growth is not a key factor that influence rating changes. This finding conforms to Cole et al (2011) who establish that the impact of growth on potential ratings is ambiguous.

Regression C provides alternative to measure organizational form. Form is a dummy variable to indicate the structure of the insurance companies. The dummy variable is denoted as 0 for stock insurer and 1 for mutual insurer. In this Alternative Model, organizational form reflects whether an insurance company is a publicly-traded company or a privately traded company. The dummy values are modified to represent 0 for publicly-traded companies and 1 for privately-traded companies. After the adjustments, the output shows that organizational form loses its predictive ability to influence rating performance. Thus, it could be assumed that being a public-listed insurer does not help to improve rating performance.

Interestingly, in all regressions except Regression C, the variable form remains as the most significant determinant that influences rating performance (sig. at 1%). The managerial decision making in the insurance industry relies on the organizational forms (stock or mutual insurer). In addition, risk-taking, investment and product-mix strategies differ according to their ownership structure, contracting interest and internal governance. Mutual insurers exercise more caution in their operations as compared to stock insurers. Both insurers tend to obtain rating in order to promote their good reputation to the public and to protect their market shares (Pottier 1997). This might be a possible justification to explain the importance of organizational form in a rating performance.

Table 5.6.7.3

Regression Results for Model 3 – By Type of Insurer

General Insurers only, 164 observation, 2006 - 2009

Panel A: Regression Results			
Variable			
RATING	Coefficient	Robust Std. Err.	P>|z|
LEV	.4367	.4603	.343
PROFIT	.0752	.0152	.000 ***
LIQUID	.0020	.0012	.092 *
LnSIZE	.2011	.0600	.001 ***
REINS	-.0011	.0060	.851
GROWTH	-.0020	.0025	.452
FORM	-.7729	.1300	.000 ***
Wald Chi2(7)	122.06		
Pseudo R2	0.0556		
Prob> chi(2)	0.0000		
Panel B: Marginal Effects			
LEV	-.0432	.0482	.371
PROFIT	-.0074	.0025	.003 ***
LIQUID	-.0002	.0001	.104
LnSIZE	-.0198	.0078	.011 **
REINS	.0001	.0006	.851
GROWTH	.0002	.0002	.450
FORM	.1310	.0268	.000 ***
*** sig. at the 1% level	**sig. at the 5% level	* sig. at the 10% level	

Source: Author's computation using Stata SE v.12

The regression results for Model 3 are shown in Table 5.6.7.3. Model 3 is estimated based on type of insurers, which in the data set includes general (non-life), and life insurers. Altogether, there are 190 observations over the four years period. Out of these 190 observations, 164 observations are from general insurers. The balance of 26 observations is derived from life insurers. Due to limited number of observations for life insurers, the model could not be estimated appropriately. Thus, the estimation reported in Table 5.6.7.3 focuses only on general insurers.

Based on the outcomes in Table 5.6.7.3 (Panel A), it could be concluded that variables profit, size and organizational forms have proven to be statistically significant (sig. at 1%) determinants to influence rating performance. In addition, liquidity is also one of the determinants that affect rating performance (p-value 0.092, sig. at 10%). The model therefore proposes that the rating performance for general insurers is positively related to leverage, profitability, liquidity and size and negatively related to reinsurance, growth and organisational form.

In terms of the marginal effects (refer to Panel B), a one unit decrease in profitability will reduce the chance of obtaining higher rating grade of 0.0074. Similarly, a decrease in size would also reduce the chance of obtaining good grades of about 0.02. On the other hand, an increase in the organizational form indicates better chance of obtaining higher rating grade of 0.14. In other word, mutual insurers have better chances of obtaining higher rating grades. This contradicts the findings from Kartasheva and Park (2012) that highlight that stock insurers are positively related to firm's rating. All findings from this regression are applicable to general insurers only.

Table 5.6.7.4
Regression Result for Model 4: Comparative Analysis
Between Pre-Financial Crisis and Post-Financial Crisis periods
All Insurers, 190 Observations

Variables	Pre-Financial Crisis		Post-Financial Crisis	
	2006 - 2007		2008-2009	
RATING	Coefficient	Sig.	Coefficient	Sig.
LEV	-.2141 [.680]		.2760 [.645]	
PROFIT	-.0420 [.110]		.1038 [.024]	***
LIQUID	.0037 [.002]		.0014 [.020]	
LNSIZE	.2355 [.085]	***	.2665 [.089]	***
REINS	-.0046 [.004]		.0032 [.014]	
GROWTH	-.0001 [.003]		-.0021 [.004]	
TYPE	.1782 [.308]		.5610 [.296]	*
FORM	-.5260 [.172]	***	-.1865 [.000]	***
Total Obs.	98		92	
Wald Chi2 (8)	57.36		101.74	
Prob> Chi2	0.0000		0.0000	
Pseudo R2	0.0622		0.1188	
	Panel B: Marginal Effects			
LEV	.0221 [.068]		-.0503 [.390]	
PROFIT	.0043 [.012]		-.0041 [.002]	*
LIQUID	-.0004 [.001]		-.0501 [.001]	
LNSIZE	-.0243 [.011]	**	-.0105 [.006]	*
REINS	.0005 [.001]		-.0001 [.001]	
GROWTH	.0001 [.001]		.0001 [.001]	
TYPE	.0166 [.026]		.0350 [.031]	
FORM	.0793 [.006]	**	.1408 [.043]	***

*** sig. at the 1% level ** sig. at the 5% level *Sig. the 10% level

Source: Author's computation

Table 5.6.7.4 depicts the comparative regression analysis between two different financial periods, namely the pre-financial crisis period and post-financial crisis period. The regression analyses are estimated using the robust standard error basis. This analysis attempts to answer the research question – does the financial strength rating performance differ between these two periods of observation? In addition, researcher would also like to identify the significant factors that cause the difference. Many scholars have established studies on the existence of adverse effects caused by the financial crisis (Baluch 2009). Additionally, Schich (2009) and Harrington (2009) predict greater probability of rating downgrades as the impact of the recent financial crisis. Thus, this study investigates if similar conclusions can be observed in the sample.

The regression results provide evidence that rating performance differs between the two periods (pre-FC and post-FC). Further analysis shows that the determinants that could influence rating grades also differ significantly. In the pre-FC period, company size and organizational form have established a statistically-significant relationship with rating grades. However, organizational form depicts a negative association with rating grades. Company size shows positive linkage to rating performance. Thus, it could be concluded that in the pre-FC period, rating performance is positively correlated to company size and negatively correlated to organizational form.

Interestingly, profitability loses its influential power during the pre-FC period. A possible justification might be due to the period of observation which includes year 2007 in the pre-FC pool. Based on the literature, the onset of financial crisis is mid-2007. Thus, the variable profitability becomes an insignificant factor to influence rating performance. It might be due to the impact of the financial crisis which is already apparent in 2007 and weakens insurer's overall performance (Guinn et al 2008, Schich 2009 and Harrington 2009).

Conversely, results in the post-FC show a variation. In line with the empirical studies that emphasized on the importance of profitability in financial performance, profitability becomes significant (p-value 0.000, sig.at 1%) after the crisis. Alternatively, profitability remains as one of the key determinants that influence rating performance and ensure survival of an insurance company. A similar trend shows that company size and organizational form remain as the important factors to influence rating grade in both periods. Company size is positively linked to rating grade (p-value 0.003, sig.at 1%) while organizational form is negatively linked to rating grade (p-value 0.000, sig. at 1%).

Interestingly, in the post-FC period, business type also becomes one of the significant factors that influence rating grade (p-value 0.058, sig.at 10%). This might be due to the fact that general insurers tends to be more vulnerable to rating fluctuations during the crisis, while life insurers depict rating stability over the short run (Munich Re. 2014).

Marginal effects shown in Panel B reflect slight variations between the two periods. During the pre-FC period:

i. a one unit decrease in company size will reduce the chance of obtaining higher rating grade by 2.43%.
ii. a one unit increase in organizational form will increase the chance of obtaining higher rating grade of 7.9%.

However, during the post-FC period:

i. a one unit decrease in profitability will reduce the chance of obtaining higher rating grade by 0.4%.
ii. a one unit decrease in company size will reduce the chance of obtaining higher rating grade by 1%.
iii. a one unit increase in organizational form will increase the chance of obtaining higher rating grade of 14%.

Apparently, organizational form remains as the most significant factor that influence rating performance. In this instance, a mutual insurer has better chances of obtaining higher rating grades, as opposed to stock insurers.

Thus, the findings manage to answer the research questions, which are:

i. There is a significant difference in performance between the pre-financial crisis period and post-financial crisis period.
ii. The financial determinants that affect rating grade also differ. Size and organizational form depict a statistically significant association with rating grade in the pre-FC period. On the other extreme, profitability, size, business type and organisational form become the significant factors that influence rating grade in the post-FC period.

It is noteworthy to highlight that one of the findings contradict the empirical theory that serves as the basis of the hypotheses' developments. The researcher hypothesized that stock insurers are more likely to obtain a higher rating grade than mutual insurers (H7). However, the finding reflects the opposite – there is a negative association between organization form and rating performance. In this instance, mutual insurers are more likely to obtain a higher rating grade than stock insurers (p-value 0.000, sig. at 1%). Nonetheless, the association between organisational form and rating has never been established in previous studies. This could be an indication that mutual insurers are still in a stronger financial position relative to stock insurers after the crisis.

On the other hand, leverage, liquidity, reinsurance and growth are statistically insignificant in explaining rating performance. Thus, we have to accept the null hypotheses that these factors do not influence rating grades. Alternatively, the performance of UK insurance companies is not determined, or not influenced by these factors.

Perhaps a notable finding is related to the impact of growth on potential ratings. Cole et al (2011) establish that the impact is ambiguous. A strong growth position might reduce uncertainty and help to convey favorable financial position. The study investigates the impact of growth on rating performance but it could not ascertain any association between growth and rating performance. The findings show that growth is not a significant factor to explain rating changes.

CHAPTER 6
CONCLUSIONS AND RECOMMENDATIONS

This chapter discusses relevant conclusions that can be derived from our analysis. The significant research findings and major contributions will be summarized. The implications and limitations of the study will also be addressed. In addition, this chapter will also include recommendations for future research.

6.1 OVERALL CONCLUSIONS.

These conclusions are based on the theoretical foundation and empirical analyses that have been conducted in this study. The conclusions are presented as follows:

6.1.1 Rating Transition Analyses

On the reflection of a rating grade:

A.M Best rating grades are assigned to insurers based on their financial ability to fulfill ongoing insurance obligations. In this instance, ongoing insurance obligations refer to claim payments to policyholders as, and when, required. This could be associated with the nature of insurance business. Insurance is a contract of uncertainty. The timing and magnitude of loss are unknown until it occurs. Thus, insurers must be in a financially-able position at all time, to fulfill their obligations under the contract. The financial ability to do so is reflected in the rating grades assigned to the insurers.

Rating grades are good indicators of insurer's financial performance (Wang and Carson 2014). Insurers who obtain higher rating grades can convey positive financial outlook to the market and the public. They will have more opportunity to secure new business growth and lower market cost of capital. In return, customers or policyholders will have more assurance about the reputation of the company in fulfilling their financial obligations irrespective of the economic

outlook. Thus, it is imperative for insurers to reflect good rating grades in order to protect their reputations.

On the impact of a rating change:

There are pros and cons following a rating change. A rating upgrade signifies a positive outlook on the insurer's financial performance. The market will react positively following a rating upgrade, providing more business opportunities and higher profitability in the long-run. Conversely, a rating downgrade poses threats to insurers. Rating downgrade implies deterioration in insurer's financial strength. Insurers might be experiencing financial difficulties, losses due to catastrophic risks or mismanagement issues. These deficiencies will be considered in the rating assessment (A.M Best 2010) that will eventually impair the rating outlook of an insurer. Thus, rating downgrades is not a favorable market indicator. In addition, negative rating outlook (rating downgrade) triggers a negative reaction from the market (Eckles and Halek, 2012).

On the trends in rating movement:

The findings imply that insurers have a higher possibility of rating upgrades. In addition, insurers with higher rating grades depict rating stability over the long run (Carty and Fons 1994). In this instance, they have better chances of maintaining their current rating positions, signaling a stable financial performance.

A notably contradictory finding shows that insurers with good rating grades are still susceptible to rating fluctuations. This is evident in cases of A+ rated insurers. Despite being rated in the superior category, these insurers reported higher possibility of rating downgrades. The chances of a rating downgrade of the announcement that indicates a rating downgrade is indeed an unfavorable event in the market. It reflects a negative outlook of the overall company performance. In return, this will influence customers'

perception towards the insurer and restrict new business opportunities.

Interestingly, insurers in the lower rating categories depict positive rating outlooks. They have a greater probability of being upgraded to a higher rating category, which is a favourable outcome. In addition, the sample includes a special rating category, namely NR5. These rating grades are assigned to insurers in the A.M Best database, on the basis that they have applied and obtained rating grades from the agencies, but they did not formally maintain regular rating assessment exercise. Frydman and Schuermann (2008) state that the NR-grade itself does not reflect "good' or "bad" rating performance. In this study, NR5-rated insurers show remarkable chances of rating upgrades. Thus it is concluded that NR-rated insurers do not signify poor financial performance.

6.1.2 Regression Analyses

On the determinants of financial strength rating:

The theoretical model hypothesises eight variables that could be the significant determinants of rating performance. These include leverage, profitability, liquidity, company size, reinsurance, growth, type of business and organizational form.

The findings affirm that the key financial determinants of financial performance, as reflected in the rating grades are influenced by profitability (Adams et. al 2003), liquidity (Almajali 2012 and Omondi and Muturi 2013), company size (Ahmed 2011 and Charumathi 2013) and organizational form (Kartasheva and Park 2012). All these variables reflect a positive and statistically significant association with rating grades. Conversely, leverage, reinsurance, growth and type of business depict no statistical association with rating grades. The findings attest to this, hence it fails to reject the null hypotheses.

This study uses a different approach to define LNSIZE (company size) in the model. Instead of using the total assets, it uses gross premium written as the basis for measuring company size (LNSIZE). Van Gestel et al (2007) argues that gross premium written is more applicable in an insurance setting while total assets more applicable to banks and corporations. The finding from this study conform that gross premium written can be used as the basis to measure company size. In fact, there is a statistically significant trend for LNSIZE in all regression models irrespective of the observation period or differences in model specifications. Perhaps, this finding is the main contribution to the existing literature, on the definition and measurement of significant variables that influence the financial performance of insurance companies.

6.1.3 Comparative Analysis

On the impact of the financial crisis:

The findings show that insurers are not immune to the effect of the recent global financial crisis. This conclusion is based on the comparative analyses that have been attempted, to reflect on this consequence.

From the comparative rating transition matrices, the study detects more variations in rating movements in the post-financial crisis period. In addition, general insurers reflect less stable rating outlooks compared to life and general insurers. Fluctuations in the rating movement are more noticeable, and general insurers that have been assigned rating grade “A+” are threatened by higher chances of rating downgrades. This finding contradicts the underlying theory that emphasized insurers with higher rating grades depict rating stability and are less susceptible to rating downgrades (Carty and Fons 1994).

From the regression analysis, it demonstrates that organizational form (FORM) is the most statistically significant determinant of rating performance. However, it shows a negative association with rating

performance. The findings reflect that mutual insurers are more likely to be assigned higher rating grades than stock insurers. In this instance, mutual insurers depict better financial strength during the financial crisis event. This is a good signal to the market, focusing on the financial stability and capacity to fulfill obligations even during the crisis period.

In addition, company size (LNSIZE) is also one of the statistically significant determinants of rating performance. The variable remains steadfast in both periods and shows remarkable stability. Large companies are found to have a competitive advantage over small firms as large firms have extensive resources and have better position and capacity to compete in the market (Omondi and Muturi 2013).

In the pre-financial crisis period, the financial determinants that affect FSR are profitability, size and organizational form. However, in the post-financial crisis period, only size and organizational form remains as significant factors that influence FSR. Thus, it is assumed that insurers's profitability are affected during the financial crisis.

6.1.4 Insurers' Financial Performance

On the performance of general insurers:

The focus of this study is to evaluate the performance of general insurers. The motivation behind this selection is due to the nature of the general insurance business, which is known to transact short-term businesses. Ultimately, the general insurers are exposed to higher risk, and the market itself is highly fluctuated and volatile. Another downside to the general insurers is that they have more short-term obligations to fulfill, and this could lead to a higher tendency of experiencing financial problems in the short-run. The findings affirm that the general insurance market is highly fluctuated and volatile. This is manifested in the fluctuations in rating transitions matrices and

wider variations across rating grades, as opposed to life and composite insurers.

On the performance of life and composite insurers:

Life and composite insurers show more stable rating trends compared to general insurers. A similar outcome shows that insurers with lower rating grades have a better possibility to be upgraded in the next rating assessment exercise. On the contrary, life and composite insurers have lesser rating variations with concentration on the higher rating grades [i.e.: B+ and above]. This could be a positive signal to the market that these insurers have strong or good financial performance as reflected by the rating grades.

However, the analyses in the study are restricted to a small sample size. Life insurers and composite insurers represent only about 30% of the total sample. Thus, this is not an ultimate conclusion on the issue of life and composite insurers' performance.

6.2 SIGNIFICANT CONTRIBUTIONS FROM THE STUDY

This study contributes to the current body of knowledge in the field of financial performance of insurance companies as follows:

i. It analyses the rating trends of insurance companies in the UK in order to predict rating movements (upgrade or downgrade). The trends are reflected in rating transition matrices, which include the degree of possible change (in percentage) and the direction of change (whether an insurer has the probability of a rating upgrade or a rating downgrade). To the best of author's knowledge, rating transition analysis has not been attempted on UK insurer before this.

ii. It investigates and determines the key financial determinants that influence rating grades assigned to insurers. In this case, rating grades are significantly influenced by profitability, liquidity, company size and organisational form.

iii. It confirms the underlying theoretical foundation on the most appropriate measure of company size. In an insurance application, company size is reflected better by using the gross premium written instead on the total assets.

iv. It fills the gap in the literature by extending previous research to incorporate a different population (instead of US), a longer period of observations and different measurement for the variables.

v. It analyses the impact of the recent financial crisis on insurance companies. The impact is reflected by comparing insurers' financial performance in two different periods – the pre-financial crisis and the post financial crisis. The comparative analysis is performed on both, the rating transition analyses and the regression analyses. Again, a comparative analysis on this subject has not been attempted by others since the financial crisis is a recent phenomenon that affects the insurance industry.

6.3 A COMPARATIVE DISCUSSION ON THE FINDINGS

This section will briefly compare the findings obtained from this study with findings obtained by other researchers. Similarity and differences will be highlighted accordingly.

On the rating transition analyses:

Compared to bond ratings, there is still lack of studies on insurance rating transitions (Wang and Carson 2014). This study attempts to extend the work of Wang (2010) and others by concentrating on insurance companies in the United Kingdom (UK). To the best of author's knowledge, there has been less discussion on insurer's rating changes in the UK compared to the US. Thus, this study seeks to contribute to the literature by investigating rating trends and forecasting rating transitions of the UK insurers. The analyses demonstrate significant degree of rating changes, which is reflected by the rating fluctuations in the matrices.

Theoretically, insurers with higher (better) rating grades depict rating stability over the long-run (Jafry and Schuermann 2004). Their study focus on credit rating history of S&P rated US firms. They concluded that these insurers have better chances of maintaining their current rating position, which reflects stability in their financial performance. The same idea is hypothesized by Wang and Carson (2014) on an US based study. Interestingly, findings from this study show that insurers in the lower rating categories depict positive rating outlooks with higher probability of rating upgrades. In addition, a notable contradicting finding shows that insurers with good rating grades are still susceptible to rating fluctuations.

Evidence form the analysis shows that A+ rated insurers reported higher degree of rating downgrades. This is a negative outlook on the financial performance of the insurer which could influence customers' perception towards the insurer and restrict new business opportunities. Similar to Kartasheva and Park (2012), general insurers in the sample are more likely to be rated and depict higher rating grade variations over the years.

On a global perspective, Hadad et al (2009) study the rating migration of financial corporations in Indonesia. They conclude that the creditworthiness and rating grades of financial companies improve over time. However, the findings from this study depict rating fluctuations over time, and that general insurers have the most fluctuations in the rating trends. This might be due to the impact of the financial crisis, which is illustrated in the rating fluctuations.

As a general conclusion, findings derived from this study differ from the previous studies. The differences might be due to different insurance industry are subject to difference regulation and supervision. The UK insurance industry is subject to dual-regulation, which is aimed to protect both the players and the customers in the industry. In addition, findings from this study also depict rating fluctuations over years. The inclusion of financial crisis periods in the data set might affect the rating trends, as reflected by the fluctuations.

On the regression analyses:

Previous studies such as Pottier and Sommer (1999) and Gaver and Pottier (2005) focused on US insurers. In these studies, company size is defined insurance based on the total assets. However, Van Gestel et al (2007) argue that the total assets are more appropriate in evaluating the banking sector while gross premium written is more relevant in assessing the insurance sector. Hence, this study adopts a different basis of measuring company size, which is the gross premium written as suggested by Van Gestel et al (2007).

Kartasheva and Park (2012) focus their study on US insurers that are exposed to catastrophic risk. In their study, they hypothesized that stock insurers are more likely to be assigned higher rating grades. Similar hypothesis is adopted in this study. However, the findings failed to support this notion, where there is a negative linkage between organizational form and rating grade. It signifies that mutual insurers are still superior in terms of their financial performance and these insurers have higher tendencies to obtain higher rating grades compared to stock insurers.

This study extends the work of Gaver and Pottier (2005) by expanding the time horizon. Gaver and Pottier studied 80 publicly-traded US general insurers for one year, which is 1997. This study manages to shift the focus group by incorporating UK insurers over a 4-year period. By expanding the time horizon, findings from this study are able to reflect that rating trends fluctuate over the long run. In addition, general insurers are exposed to a larger degree of rating fluctuations, as opposed to life insurers.

On a global perspective, findings from this study conforms to Almajali (2012) and Omondi and Muturi (2013). From these studies, it is concluded that profitability and company size remain as key determinants that influence financial performance. A study on the Romanian insurance industry conducted by Burca and Batrinca (2014) also conforms to these findings. However, these studies also use total assets as proxy to company size.

Hence, this study seeks to contribute new findings to the literature, by using a different approach to measure company size. Interestingly, even though with a different measurement basis, the result from the regression is able to support the hypothesis, that there is a statistically significant association between company size and rating grades. Thus, it could be concluded that gross premium written can be utilised and is appropriate to measure company size.

On the other hand, leverage, reinsurance and growth depict a statistically insignificant association with rating grades. It could be inferred that these variables might not be the key determinants that affect rating performance of an insurer.

6.4 PRACTICAL IMPLICATIONS FROM THE STUDY

The first implication of this study is related to the company size. Since company size is significant for determining rating performance, insurance companies should put more efforts to strengthen their company size and to seek alternatives that could help to increase size. In this study, size is defined on a gross premium written basis. As such, gross premium written relates to the number of insurance contracts that have been sold to consumers, both private and commercial insurance buyers. Thus, gross premium written increases as the volume of insurance purchases increases. A key issue is how do insurers expand their businesses in order to increase the gross premium written?

The study recommends that insurers should expand their businesses in order to achieve an optimum size and to enjoy economies of scale. An optimum size will ultimately strengthen financial performance. Large insurance companies are in a better position to create robust supporting infrastructures to enhance business operations. Some of the expansion strategies are to reform risk management standard, upgrade information management systems and improve their technical and management expertise. In addition, business expansion should also consider introducing innovative and more diversified products targeted at both local and

international markets. Product diversification is a good strategy to tap into existing, and new markets. These actions are essential to ensure business sustainability and competitiveness in the insurance industry.

The second implication is that general insurers are more susceptible to the risk of financial instability. The nature of their short-term business increases fluctuations and volatility in the market. General insurers are more susceptible to risk, due to the short-term financial obligations. Thus, they have to establish strong financial capacity in order to fulfil their obligations to policyholders. General insurers have to adopt proactive strategies to stabilise rating fluctuations, with concentration on strengthening their capital, profitability and liquidity bases. These are the key determinants that could influence the overall financial performance on an insurance company.

The third implication is that rating is slow to react to changes. Thus, any discrepancies or financial distress will not be reflected in the rating trends over a short period of observation. In other words, rating trends in the short-run remain stable, without any volatile changes. Since rating is slow to change, this could be an advantage to the insurer. In this case, understanding the determinants that affect rating changes is a beneficial effort. By understanding the mechanics of rating changes, insurer could react immediately to rectify and improve their financial conditions. In addition, insurers might be able to devise appropriate strategies to strengthen their financial performance, ensure rating stability or to attain rating upgrade. Consequently, better financial performance relates to higher rating grades which are more favorable than rating downgrades.

The fourth implication is the analyses strategies in this study provide useful tools to evaluate the financial performance of insurance companies. Insurers can attempt to generate the rating transition matrices in order to predict their rating trends. Subsequently, insurers can also adopt the regression model to identify the most significant determinants that affect their FSR performance. These analyses can serve as the initial or internal

assessment that could be done by each and every insurance company in order to detect financial problems at its inception.

6.5 CRITIQUE OF THE RATING AGENCIES – CONFLICT OF INTEREST

The principal rating agencies in the industry have two important functions in the capital market. First, they play a valuation role by disseminating rating information to the market participants. Second, the agencies facilitate financial regulation and monitoring, since the rating grades that they published are efficient and reliable credit quality benchmark (Frost 2006).

Rating agencies actions are primarily influenced by the incentive to protect their reputation as the delegated monitoring agencies. The conflict of interest arises out of the agencies' financial incentives to accommodate the preference of the obligors (rated companies) since the agencies are chosen and compensated (fee) by the obligors (Covitz and Harrison 2003). The incentives contradict the agencies' primary objectives which are to be an independent body and to be objective in the rating assessment process. Subsequently, the conflict of interest is also triggered by the agencies' economic interest in basing a credit rating on anything other than an obligor's creditworthiness (IOSCO 2003). The actual conflict of interest could distort agencies' objectivity and influences the rating process.

Prior to the 1970s, financial incentives for rating agencies are structured as paid subscription fee basis. However, this incentive structure loses its reliability, becomes obsolete and is replaced by fee/charges imposed on the obligors. Obligors are willing to pay high rating fees since they would benefit from positive rating outlooks (rating upgrade) (Cantor and Packer, 1994). It has been debated that rating agencies reliance on fees might encourage them to issue more favorable ratings and to be less diligent in probing for negative information (SEC 2005).

The recent criticisms on rating agencies are about the timeliness to change the rating grades and the stringent assessment practices (Frost 2006 and

White 2010). In addition, Frost (2006) highlights three key issues relevant to rating agencies, which are timeliness, stability and accuracy. Cases of major financial institution failures such as Enron (in 2001), Worldcom (in 2002) and Lehman Brothers (2008) further demonstrated that rating agencies are slow to react to changes. In addition, one could question the tardiness of the rating agencies in adjusting the credit rating of the obligors.

Covitz and Harrison (2003) claim that if a conflict of interest strongly influenced the rating agency assessment, the agencies will react slower to negative outlooks (potential rating downgrade), especially if it is associated with their larger clients. Egan-Jones (2002) argues that rating agency's reliance on financial incentives leads to many unmanageable conflicts of interest, thus hampering their objectivity and accuracy of the rating assessment. Frost (2006) summarises three key issues relevant to rating agencies, which are timeliness, stability and accuracy.

Harrington (2011) claims that said ratings agencies suffer from a conflict of interest since these agencies are paid by the firms that applied for a rating assessment. In addition, he said that the conflict of interest exists in all levels of employment, from entry-level analyst to the chairman and chief executive officer of the rating agency. As a former senior president at Moody's, Harrington claims that Moody's uses a long-standing culture of "intimidation and harassment" to persuade its analysts to ensure that the rating's issued will be able to satisfy the client's requirement. A similar conflict of interest exists in other rating agency practices. Hence, the US financial regulator - the securities and exchange commission (SEC), is deliberating new rules to reform the agencies in order to solve the conflict of interest issues.

The Dodd-Frank Wall Street Reform and Consumer Protection Act (Dodd-Frank) was implemented in July 2010. The Act is introduced as a corrective measure after the global financial crisis. Among its various provisions, Dodd-Frank defines a series of broad reforms to the Credit Rating Agencies (CRA) market. Dodd-Frank's CRA provisions significantly increase CRAs' liability

for issuing inaccurate ratings, and make it easier for the SEC to impose sanctions and bring claims against CRAs for material misstatements and fraud. However, CRAs respond to the increased regulatory pressure by issuing lower, less informative corporate bond ratings to protect their reputation. Small (2014) claims the Dodd-Frank Act has led to a loss of information in the market for corporate credit ratings. Hence, regulators and policymakers continue to debate the best way to restructure the credit rating industry and the conflict of interest issue.

6.6 LIMITATIONS AND RECOMMENDATIONS FOR FUTURE RESEARCH

The major limitations of this study are the sample size and access to data. Our study requires two datasets in the analysis, which are the rating data and the financial data. These data, however, are not completely available to the public. Thus, this study derives small sample size, restricted to companies with complete and available data during the period of observation. A possible justification for this limitation is that the rating assessment is a voluntary practice and is costly. Thus, it is not necessary for insurers to obtain a rating or to maintain the rating assessment on a frequent basis. The same issue has been raised in many studies (Hadad et. al 2009, Ismail 2013 and Burca and Batrinca 2014).

The rating transition matrices are based on the cohort method. It is a discrete estimation approach that has been used by many credit managers to predict future changes in ratings (Xing et al 2012). However, the analysis can be expanded to adopt a continuous estimation approach. The continuous approach requires access to continuous-time information on rating transitions, and the exact dates of rating changes. The results from the continuous estimation approach should reflect better and updated information on rating movements. However, continuous-time rating data are costly, which is a constraint in this study.

Furthermore, the rating transition matrices only reflect rating transitions (movement from one rating grade to another, an upgrade or a downgrade)

but it does not justify the reasons for the transitions. Thus, future research should attempt investigate the justifications of a rating change, as reflected in the transition matrices. The justification could be incorporated in the RTM analyses, hence it will provide precise findings and better understanding about the fundamental theory of rating transitions.

Eight firm-specific factors are included in the regression analysis. The inclusion of these variables relies heavily on the available financial information, drawn from the database. The variables also focus on financial indices that have been proven to be significant determinants of the financial performance of the insurance companies. The study adheres to the variable guidelines proposed by Van Gestel et al (2007) on the most appropriate variables to measure rating performance, which is applicable to all types of insurers. However, the inclusion of non-financial determinants, or qualitative factors will produce more accurate estimations in evaluating financial performance. Such data (qualitative factors) were not available in this study, which is another limitation and should be addressed in future research.

The opportunity to investigate this research theme is boundless. It might be feasible to investigate the impact of listed insurance companies on insurer's financial performance. In addition, the inclusion of qualitative variables in the analyses will produce more accurate estimations and better evaluation in assessing insurer's financial performance.

Further investigations could also be done to study the impact of the recent global financial crisis on insurance companies. Instead of focusing on the UK insurance industry, future studies should focus on other industries such as the European countries or Asian insurance markets. It is also recommended to conduct a comparative analyses based on geographical basis. Thus, better conclusions could be derived about the financial resilience of an insurance company, relative to the others. Alternatively, insurer performance could also be compared by looking at the rating grades assigned by different rating agencies and type of insurance business.

The rapid evolution of the industry worldwide provides an indefinite avenue for research. The recent global financial turmoil had caused large losses in the industry and the latest regulatory reforms change the industry. All these evolutions and threats necessitate further investigations and should be the focus in future researches.

6.7 CONCLUDING REMARKS

Financial performance is not a new theme in scholarly research. The topic has been discussed by many, perhaps as early as 1967 (Denenberg 1967). Nevertheless, the opportunities to investigate this topic are unlimited. In addition, insurance companies are principal players in dynamic financial markets and the evaluation of the performance and creditworthiness has become more important nowadays.

The well-being of insurance companies is of importance to various stakeholders such as policyholders, policymakers, investors and managers. However, research on insurance companies is much more limited and does not offer a very clear result about feature selection, models, methods and accuracy results (Florez-Lopez 2007 and Doumpos et al 2012).

This study has proposed several appropriate models to analyse financial performance of insurance companies. The analysis is based on the rating grades assigned to insurers. The rating grades are analysed using non-Markov model and rating transition matrices, while the key determinants that affect the rating grades are determined using ordered probit regression models.

The findings from the empirical analyses managed to answer all research questions and are summarized as follow:

i. There is a higher probability of rating upgrades than rating downgrades as reflected in the rating transition matrices (answering research question 1)

ii. There is an outstanding difference in the rating performance between the pre-financial and post-financial crisis periods (answering research question 2).
iii. It is determined that profitability, liquidity, company size and organizational form are the key determinants that influence FSR performance (answering research question 3).
iv. There is a significant difference in performance between the pre-financial and post-financial crisis periods (answering research question 4).

Despite all limitations, evidence and findings derived from this study provide useful insights into the determinants of the financial performance of the insurance companies in the UK. The followings are concluded:

i. Rating changes are influenced by profitability, liquidity, size of the company and organisational form.
ii. In a stable economic outlook, stock insurers tend to achieve higher rating grades than mutual insurers. However, in an unstable environment, the financial performance of mutual insurers remains strong, as reflected in higher rating grades.
iii. Size of a company is one of the most significant factor that affects financial performance. In addition, this study affirms that using gross premium written as the basis for measurement does not violate the theoretical foundation.
iv. The financial performance of general insurers fluctuates and less stable compared to the life and general insurers. Their performance is mostly affected by the recent financial crisis. Subsequently, their rating performance also demonstrates a similar trend, indicating that the general insurance market is a volatile market.
v. The combination of multiple approaches to evaluate financial performance provide more accurate justification of the subject matter and can be applied by all insurers as internal assessment of their own financial performance.

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APPENDIX A – Company Identification

087400 Amtrust Europe Limited
087492 Aviva Annuity UK Limited
087222 Ansvar Insurance Company Limited
077102 Arch Insurance Company (Europe) Limited
084806 Aspen Insurance UK Limited
085250 Aviva Insurance UK Limited
085047 Aviva International Insurance Limited
086137 Aviva Life & Pensions UK Limited
086954 Brit Insurance Limited
077622 Catlin Insurance Company (UK) Ltd.
085266 CGNU Life Assurance Limited
085630 Chubb Insurance Company of Europe SE
087873 Commercial Union Life Assurance Company
086286 Ecclesiastical Insurance Office plc
087327 Electrical Contractors' Insurance Co Ltd
083234 Endurance Worldwide Insurance Limited
086628 Faraday Reinsurance Co Limited
086695 First Title Insurance plc
086513 FM Insurance Company Limited
086483 General Reinsurance UK Limited
087366 Globe Insurance Company Limited
078730 Hartford Financial Prod Int'l Ltd
085551 Hannover Life Reassurance (UK) Limited
086160 Great Lakes Reinsurance (UK) PLC
078652 InterGlobal Insurance Company Limited
086912 Hiscox Insurance Company Ltd
086999 HSB Engineering Insurance Limited
086486 International Ins Co of Hannover Limited
078390 Lancashire Insurance Company (UK) Ltd
084279 Legal & General Assurance Society Ltd
087425 Liberty Mutual Insurance Europe Limited

085202 Lloyd's of London
085106 London Assurance
087438 London General Insurance Company Ltd
084203 London General Life Company Limited
090092 Stewart Title Limited
085108 Sun Insurance Office Limited
086222 Sun Alliance and London Insurance plc
086497 Sunderland Marine Mutual Ins Co Ltd
087376 Travelers Casualty & Surety Co of Europe
088986 Torus Insurance (UK) Limited
084975 TT Club Mutual Insurance Limited
085363 Travelers Insurance Company Limited
087660 USAA Limited
083829 W R Berkley Insurance (Europe) Ltd
087674 XL Insurance Company Limited
078187 Newline Insurance Company Limited
087802 Pinnacle Insurance plc
086126 QBE Insurance (Europe) Limited
086257 Royal & Sun Alliance Insurance Plc
085187 Royal & Sun Alliance Reinsurance Limited
089074 SCOR Insurance (UK) Limited
085448 SCOR UK Company Ltd
085619 Skandia Life Assurance Company Limited

APPENDIX B
Stata.do file: RTM All Insurers

```
log using rtmall.log, replace
use "C:\Users\User\Documents\rtmall.dta", clear
*DECLARING THE PANEL DATA SET USING XTSET
xtset ratee year
*TABULATING THE DATA USING XTTAB
xttab rating
*GENERATING 8-YEAR RATING TRANSITION MATRIX USING XTTRANS
xttrans rating
*SCREENING DATA FOR 5-YEAR ANALYSIS
keep if year==2006|year==2007|year==2008|year==2009|year==2010
*THE NEXT FEW LINES DECLARE, TABULATE AND GENERATE 5-YEAR
RATING TRANSITION MATRIX
xtset ratee year
xttab rating
xttrans rating
*SCREENING DATA FOR 3-YEAR ANALYSIS
keep if year==2008|year==2009|year==2010
*THE NEXT FEW LINES DECLARE, TABULATE AND GENERATE 5-YEAR
RATING TRANSITION MATRIX
xtset ratee year
xttab rating
xttrans rating
log close
```

APPENDIX C
Stata.do file: RTM by Type

```
log using rtmtype.log, replace
use "C:\Users\User\Documents\rtmall.dta", clear
*THE NEXT FEW LINES SCREEN THE DATA FOR 5-YEAR ANALYSIS SPECIFIC TO GENERAL INSURERS (Bustype==1)
keep if year==2006|year==2007|year==2008|year==2009|year==2010
keep if bustype==1
*THE NEXT FEW LINES DECLARE, TABULATE AND GENERATE 5-YEAR RATING TRANSITION MATRIX FOR GENERAL INSURERS
xtset ratee year
xttab rating
xttrans rating
log close
clear all
capture log close
log using rtmtype.log, replace
use "C:\Users\User\Documents\rtmall.dta", clear
*THE NEXT FEW LINES SCREEN THE DATA FOR 5-YEAR ANALYSIS SPECIFIC TO LIFE INSURERS (Bustype==2)
keep if year==2006|year==2007|year==2008|year==2009|year==2010
keep if bustype==2
*THE NEXT FEW LINES DECLARE, TABULATE AND GENERATE 5-YEAR RATING TRANSITION MATRIX FOR LIFE INSURERS
xtset ratee year
xttab rating
xttrans rating
log close
clear all
capture log close
log using rtmtype.log, replace
use "C:\Users\User\Documents\rtmall.dta", clear
*THE NEXT FEW LINES SCREEN THE DATA FOR 5-YEAR ANALYSIS SPECIFIC TO COMPOSITE INSURERS (Bustype==3)
keep if year==2006|year==2007|year==2008|year==2009|year==2010
keep if bustype==3
*THE NEXT FEW LINES DECLARE, TABULATE AND GENERATE 5-YEAR RATING TRANSITION MATRIX FOR LIFE INSURERS
xtset ratee year
xttab rating
xttrans rating
log close
clear all
capture log close
```

APPENDIX D
Stata.do file: RTM Comparative

```
log using rtmfc.log, replace
use "C:\Users\User\Documents\ratingfc.dta", clear
*THE NEXT FEW LINES SCREEN THE DATA FOR COMPARATIVE ANALYSIS SPECIFIC TO PRE-FC (Fc==1), GENERAL INSURERS (Bustype==1)
keep if fc==1
keep if bustype==1
*THE NEXT FEW LINES DECLARE, TABULATE AND GENERATE PRE-FC RATING TRANSITION MATRIX FOR GENERAL INSURERS
xtset ratee year
xttab rating
log close
clear all
capture log close
log using rtmfc.log, replace
use "C:\Users\User\Documents\ratingfc.dta", clear
*THE NEXT FEW LINES SCREEN THE DATA FOR COMPARATIVE ANALYSIS SPECIFIC TO PRE-FC (Fc==1), LIFE INSURERS (Bustype==2)
keep if fc==1
keep if bustype==2
*THE NEXT FEW LINES DECLARE, TABULATE AND GENERATE PRE-FC RATING TRANSITION MATRIX FOR LIFE INSURERS
xtset ratee year
xttab rating
log close
clear all
capture log close
log using rtmfc.log, replace
use "C:\Users\User\Documents\ratingfc.dta", clear
*THE NEXT FEW LINES SCREEN THE DATA FOR COMPARATIVE ANALYSIS SPECIFIC TO PRE-FC (Fc==1), COMPOSITE INSURERS (Bustype==3)
keep if fc==1
keep if bustype==3
*THE NEXT FEW LINES DECLARE, TABULATE AND GENERATE PRE-FC RATING TRANSITION MATRIX FOR COMPOSITE  INSURERS
xtset ratee year
xttab rating
log close
clear all
capture log close
```

```
log using rtmfc.log, replace
use "C:\Users\User\Documents\ratingfc.dta", clear
*THE NEXT FEW LINES SCREEN THE DATA FOR COMPARATIVE ANALYSIS SPECIFIC TO POST-FC (Fc==2), GENERAL INSURERS (Bustype==1)
keep if fc==2
keep if bustype==1
*THE NEXT FEW LINES DECLARE, TABULATE AND GENERATE POST-FC RATING TRANSITION MATRIX FOR GENERAL INSURERS
xtset ratee year
xttab rating
log close
clear all
capture log close
log using rtmfc.log, replace
use "C:\Users\User\Documents\ratingfc.dta", clear
*THE NEXT FEW LINES SCREEN THE DATA FOR COMPARATIVE ANALYSIS SPECIFIC TO POST-FC (Fc==2), LIFE INSURERS (Bustype==2)
keep if fc==2
keep if bustype==2
*THE NEXT FEW LINES DECLARE, TABULATE AND GENERATE POST-FC RATING TRANSITION MATRIX FOR LIFE INSURERS
xtset ratee year
xttab rating
log close
clear all
capture log close
log using rtmfc.log, replace
use "C:\Users\User\Documents\ratingfc.dta", clear
*THE NEXT FEW LINES SCREEN THE DATA FOR COMPARATIVE ANALYSIS SPECIFIC TO POST-FC (Fc==2), COMPOSITE INSURERS (Bustype==3)
keep if fc==2
keep if bustype==3
*THE NEXT FEW LINES DECLARE, TABULATE AND GENERATE POST-FC RATING TRANSITION MATRIX FOR COMPOSITE INSURERS
xtset ratee year
xttab rating
log close
clear all
capture log close
```

APPENDIX E
Stata.do file: Heteroscedasticity Tests

```
log using hettest.log, replace
use "C:\Users\User\Documents\opmfsr.dta", clear
*REGGRESSING THE MODEL USING REG
reg rating lev profit liquid lnsize reins growth type form
*PERFORMING BREUSH-PAGAN TEST
estat hettest
*PERFORMING WHITE'S GENERAL TEST FOR HETEROSCEDASTICITY
quietly reg rating lev profit liquid lnsize reins growth type form
estat imtest, white
```

APPENDIX F

Stata.do file: OPM All Insurers with Robust Standard Error

```
log using opmfsr.log, replace
use "C:\Users\User\Documents\opmfsr.dta", clear
*DECLARING (XTSET), DESCRIBING (XTDES) AND SUMMARISING DATA (XTSUM)
xtset coid year
xtdes
xtsum
*REGRESING THE MODEL USING OPM (OPROBIT)
oprobit rating lev profit liquid lnsize reins growth type form
log close
clear all
capture log close
log using opmfsr.log, replace
use "C:\Users\User\Documents\opmfsr.dta", clear
*DECLARING (XTSET), DESCRIBING (XTDES) AND SUMMARISING DATA (XTSUM)
xtset coid year
xtdes
xtsum
*REGRESING THE MODEL USING OPM (OPROBIT) ROBUST ESTIMATION (VCE)
oprobit rating lev profit liquid lnsize reins growth type form, vce(robust)
log close
clear all
capture log close
```

APPENDIX G

Stata.do file: OPM All Insurers Comparative

```
log using opmfc.log, replace
use "C:\Users\User\Documents\opmfc.dta", clear
*DECLARING (XTSET), DESCRIBING (XTDES) AND SUMMARISING DATA (XTSUM)
xtset coid year
xtdes
xtsum
*SCREENING DATA FOR PRE-FC ANALYSIS (Fc==1)
keep if fc==1
xtset coid year
xtdes
xtsum
*REGRESING THE MODEL USING OPM (OPROBIT) ROBUST ESTIMATION (VCE) FOR PRE-FC ANALYSIS
oprobit rating lev profit liquid lnsize reins growth type form, vce(robust)
log close
clear all
capture log close
log using opmfc.log, replace
use "C:\Users\User\Documents\opmfc.dta", clear
*DECLARING (XTSET), DESCRIBING (XTDES) AND SUMMARISING DATA (XTSUM)
xtset coid year
xtdes
xtsum
*SCREENING DATA FOR POST-FC ANALYSIS (Fc==2)
keep if fc==2
xtset coid year
xtdes
xtsum
*REGRESING THE MODEL USING OPM (OPROBIT) ROBUST ESTIMATION (VCE) FOR POST-FC ANALYSIS
oprobit rating lev profit liquid lnsize reins growth type form, vce(robust)
log close
clear all
capture log close
```